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THE SHORE BUGS (HEMIPTERA: SALDIDAE) OF THE GREAT LAKES REGION

By Toby Schuh

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THE SHORE BUGS (HEMIPTERA: SALDIDAE) OF THE GREAT LAKES REGION

By

Toby Schuh*

ABSTRACT

Twenty species of shore bugs have been collected in the Great Lakes region to date, and an additional six species might occur here. These species represent five genera.

A discussion of the identification, habitat preference, and distribution is given for each species. Distributional data is given in summary form for well known species and complete data is given for species which are poorly known or confused in the literature. Keys to all species occurring north of the 36th parallel and east of the 100th meridian, with illustrations of 17 species, are included.

The _Saldula_ "_pallipes-palustris_" group is discussed but no attempt has been made to separate species. One new species, _Saldoida_ _turbaria_ is described from Barry County, Michigan.

INTRODUCTION

This study is a review of the shore bugs of the Great Lakes region with special emphasis on those species known to occur in Michigan. Material used was collected during 1966 and supplemented with borrowed specimens. Approximately 3000 specimens were examined, over 1500 of which were collected expressly for this study.

BIOLOGY

The shore bugs are semi-aquatic Hemiptera which commonly live along the shores of ponds and streams; some live in marshy situations and some are found well-removed from any permanent water. Saldids are characterized by long four-segmented antennae, a long three-segmented beak and long legs. They are well adapted for living in littoral situations; the dense pubescence on most species prevents wetting and holds a film of air around the insect, allowing it to be submerged for short periods of time without harm.

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Shore bugs are predators and scavengers, feeding on dead or dying small invertebrates. Ekblom (1926) observed them feeding on fly larvae burrowing in the shore. Specimens I have observed in the laboratory were unable to catch live insects but would readily feed on immobilized house flies. Saldula ourayi Drake and Hottes, a common species around alkaline lakes in the Great Basin, probably feeds on the larvae and adults of ephydrid flies which are often very numerous along the shores of salty inland water bodies.

Oviposition in many species takes place in plant tissue and others lay their eggs in the substrate. Wiley (1922) studied the life history of two North American species and found they would readily oviposit in plant material in the laboratory. The ovipositor is a heavily sclerotized sword-shaped organ, with rows of teeth along its edge.

Many species are positively phototrophic, particularly the margin dwellers. These often seek cover when the sun is obscured. The species living in marshy areas and in dense vegetation are very seclusive and seldom come out into bright sunlight. For many species there appears to be a maximum and minimum substrate temperature at which activity begins and ceases. The margin dwellers become active when the substrate reaches about 60° F. and seek cover when the substrate temperature is above about 110° F.

Two different wing forms commonly occur in shore bugs. The fully winged, or macropterous forms, have well-developed front and hind wings. The short-winged, or brachypterous forms, have an abbreviated membrane in the forewings and a reduction or loss of the hind wings. Most saldids are active fliers, and nearly all are quick runners. The typical response when alarmed is to jump and simultaneously begin flying. This escape method makes most species difficult to collect. Distances traversed when alarmed range from several inches in the flightless forms to several yards in the flying ones.

TAXONOMY

Until recently the literature on the Saldidae was scattered, consisting mostly of species descriptions. No comprehensive works have appeared since Reuter (1912), except those of Cobben. Drake produced most of the recent descriptions, but included no keys and very little ecological information.

The taxonomic difficulties in the saldids are many, and several species complexes exist. The range of morphological variation in some species is extreme. The "eunomic series" for the hemelytra, as developed by Wagner (1950), is helpful for separating species. It is based on the idea that the pattern of pigmentation of the forewing is consistent within a species, varying from the lightest to the darkest forms in a regular manner.

An "eyespot" is often present medially along the lateral margin of the endocorium (Figs. 1 & 13), particularly in the genera Saldula and Micracanthia. Hemelytral pigmentation occurs in two basic forms: black pigment, encompassing most of the corium and clavus; and white pigment which forms marks or spots. Areas lacking pigmentation usually appear translucent and are clear to yellow, or light brown.

The systematic treatment used herein is that of Cobben (1959). Two subfamilies are represented in the Great Lakes region, the Chiloxanthinae and Saldinae. The Chiloxanthinae contains the genus Pentacora. The Saldinae contains two tribes, the Chartoscirtini, including the genera Micracanthia, Saldoida and Saldula, and the Saldini including the genus Salda.

TECHNIQUES

The specialization of the shore bugs creates difficulties of collection and identification. I have found the easiest way to collect them is with an aspirator and a squeeze bottle of alcohol or water. The elusive nature of saldids makes them difficult to pick up with the aspirator alone, but by first squirting them with alcohol or water they are wetted and knocked down and can be sucked up before they are able to fly away. When there is a particularly strong wind, sweeping with an aerial net is often a useful technique. By simply walking along the shoreline and sweeping in front of you at the point where the saldids begin to fly, large numbers of specimens can be obtained, particularly if they are numerous. Coloration resembling the substrate makes shore bugs difficult to see, and most collecting involves getting down on the hands and knees and looking closely.

Best results are obtained if specimens are collected directly into 70-95% ethyl alcohol. The dense vestiture of most species picks up dirt and debris, and if collected dry they will often have to be cleaned before close examination can be made. All specimens should be mounted on card points with "Elmer's" glue or a similar material.

When identifying specimens the characters of pubescence and wing marking must be observed with the light directed from the anterior end of the specimen. Measurements in many cases require a micrometer eyepiece. Measurements in the keys and text are of the greatest length or width of the entire bug when viewed dorsally. Antennal ratios are indicated for some species; these are noted as the relative lengths of the second, third and fourth antennal segments, respectively (example: II-3, III-2, IV-2). The method of measuring the width of the vertex and one eye is indicated in Figure 1.

Specimens collected for this study have hand-written numbers on the printed locality labels. These numbers refer to my locality-habitat data which will be on file in the Entomology Museum at Michigan State University. I have retained some of these specimens, and deposited others in the collections of contributing individuals and museums; the majority of the specimens are in the Michigan State University collection.

The data included in the "specimens examined" section of the text gives abbreviations of the institutions from which the specimens were borrowed. Specimens from my personal collection are denoted with a "TS".

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KEY TO THE SPECIES OF SALDIDAE FROM THE GREAT LAKES REGION

NOTE: When examining dorsal pubescence the dorsum should be level and the light should strike the specimen from the anterior.

1 Anterior lobe of pronotum with 2 prominent conical tubercles (Figs. 5 & 6) (*Saldoida*) 5
Anterior lobe of pronotum without conical tubercles 2

2 (1) Membrane always with 5 visible closed cells (Fig. 2); always macropterous (*Pentacora*) 7
Membrane with 4 visible closed cells if macropterous (Fig. 1), or if brachypterous cells may not be visible 3

3 (2) Hemelytra with long erect dorsal vestiture, at least as long as the diameter of fourth antennal segment 16
Hemelytra with short appressed pubescence, not longer than smallest diameter of second antennal segment 4

4 (3) First cell of membrane produced anteriorly not more than 1/4 its total length beyond base of second cell (Figs. 14 & 29) 21
First cell of membrane produced anteriorly about 1/3 its total length beyond base of second cell (Figs. 3 & 30) 10

5 (1) Pronotum deeply, concavely excavated on posterior margin around scutellum; posterolateral corners of pronotum not produced .... *Saldoida slossonae* Osborn, p. 14
Posterior margin of pronotum not deeply, concavely excavated, but nearly straight; posterolateral corners of pronotum produced (Fig. 5) 6

6 (5) Posterolateral corners of pronotum sharply pointed; hairs on eyes very short; vertex and frons with few erect black hairs; hemelytra mostly ocherous and dull .... *Saldoida cornuta* Osborn, p. 14
Posterolateral corners of pronotum produced but not sharply pointed (Figs. 5 & 6); hairs on eyes about as long as diameter of base of second antennal segment; vertex and frons covered with many long erect black hairs; posterior half of hemelytra black, shining (Fig. 5) .... *Saldoida turbaria* new species, p. 12

7 (2) Dorsum highly polished and shining, covered with erect hairs at least twice as long as diameter of second antennal segment; shaggy in appearance when viewed from the side; dorsum almost devoid of shorter appressed pubescence; pronotum, scutellum and corium generally uniformly dark brown; lateral margin of exocorium light; length over 5.0 mm .... *Pentacora hirta* (Say), p. 9
Dorsum not highly polished or shining, with erect pubescence about the length of diameter of fourth antennal segment, and/or short subappressed pubescence; coloration variable, but not fitting above description 8

8 (7) Lateral margin of pronotum and hemelytra with a row of short spines; length of second antennal segment nearly 3 times that of third segment; large species, length over 6.5 mm .... *Pentacora signoreti* (Guerin), p. 9

Pronotum without marginal row of short spines; second antennal segment no more than 2.5 times as long as third segment 9

9 (8) Dorsum clothed with erect hairs about as long as the diameter of fourth antennal segment and shorter reclining golden pubescence; antennae and legs with short reclining pubescence; dorsum with partial light transverse bands (Fig. 2); large species, length usually over 5.2 mm .... *Pentacora ligata* (Say), p. 10

Dorsum with only short reclining pubescence, color of dorsum uniformly light brown to mottled darker brown; smaller species, length usually under 5.0 mm.................. *Pentacora sphacelata* (Uhler), p. 10

10 (4) Dorsum black, sometimes with small scattered light markings (Fig. 30); often brachypterous; body especially convex when brachypterous 12

Dorsum with mottled coloring (Figs. 3 & 4); head, pronotum, scutellum and parts of corium dark, exocorium and membrane mostly light, usually macropterous; body flattened..............................11

11(10) Endocorium apically with a distinct unpigmented area laterally (Fig. 3); length 4.0 to 5.0 mm .... *Salda (Teloleuca) pellucens* (Fabricius), p. 26

Endocorium apically with only a small unpigmented area (Fig. 4); length 3.5 to 5.0 mm.................... .... *Salda (Teloleuca) bifasciata* (Thompson), p. 22

12(10) Dorsum black, mostly shining, nearly devoid of pubescence...13

Dorsum black, not shining, clothed with dense subappressed pubescence...................................15

13(12) Second antennal segment black with a light stripe dorsally; small slender species, length 3.8 to 5.6 mm, width 1.7 to 2.6 mm.; flattened in appearance......... *Salda (Salda) obscura* (Provancher), p. 25

Second antennal segment of nearly uniform coloration; larger species with more robust and convex body form 14

14(13) Pronotum companulate (bell-shaped); antennae stout, segments 1, 3, and 4 dark, segment 2 lighter; antennal proportions II-3, III-2, IV-2; length of brachypterous forms 5.0 to 6.0 mm ....*Salda (Salda) anthracina* Uhler, p. 22

Pronotum not particularly companulate; antennae slender, all segments dark, proportions II-5, III-3, IV-3; length of brachypterous forms 5.5 to 6.5 mm., macropterous forms 6.5 to 7.5 mm. (Fig. 30) ....*Salda (Salda) bouchervillei* (Provancher), p. 23

15(12) Dorsum with dense, reclining, golden pubescence; lateral pronotal margins nearly straight, extending to pronotal collar; length 4.5 to 5.5 mm .... *Salda* (*Salda*) *littoralis* (Linnaeus), p. 22

Dorsum with very fine appressed pubescence, not generally golden and shining; lateral pronotal margins terminating abruptly before collar; length 5.5 to 6.5 mm.................................... *Salda* (*Salda*) *buenoi* (McDunnough), p. 24

16 (3) Hemelytra solid black, shining dorsally; antennal segments one and 2, and legs light; antennal segments 3 and 4 black; anterior lobe of pronotum strongly swollen; length 3.0 to 3.5 mm.. *Salda* (*Lampracanthia*) *crassicornis* Uhler, p. 26

Hemelytra with variable markings, but not solid black; antennae and legs variable in coloration; anterior lobe of pronotum not so strongly swollen.......................... 17

17(16) Eyes with numerous conspicuous hairs (visible at about 25X) nearly as long as diameter of second antennal segment 18

Eyes without conspicuous hairs.................................. 20

18(17) Dorsum dull, nearly all black, with a marginal unpigmented area near the apex of exocorium (Figs. 22 & 23); antennal segments 2, 3 and 4 dark, covered with hairs nearly twice as long as diameter of second antennal segment; length 3.5 to 4.2 mm........... *Saldula* *separata* (Uhler), p. 21

Dorsum mostly dark colored; pronotum black, highly polished; margin of exocorium mostly light (Figs. 18 & 19).. 19

19(18) Body broad, ovate; pronotum broad, with rounded lateral margins (Fig. 21); exocorium with 2 pruinose (bluish) spots, endocorium with 3 pruinose spots, clavus with one apical pruinose spot (Fig. 19); second antennal segment with hairs nearly as long as twice the diameter of segment; length 3.2 to 4.0 mm .... *Saldula* *orbiculata* (Uhler), p. 19

Body more slender, ovate; pronotum more narrowed anteriorly, with nearly straight lateral margins (Fig. 20); clavus with one apical light spot; margin of exocorium light (Fig. 18); second antennal segment with hairs about as long as diameter of segment; length 3.2 to 4.0 mm .... *Saldula* *severini* Harris, p. 21

20(17) Hind tibia and second antennal segment with hairs subequal in length to diameter of hind tibia; length 5.0 to 6.0 mm. (wing pattern Fig. 26)... *Saldula* *confluenta* (Say), p. 16

Hind tibia and second antennal segment with hairs noticeably longer than diameter of hind tibia; length 4.0 to 5.0 mm. (wing pattern Fig. 27)....... *Saldula* *comatula* (Parshley), p. 16

21 (4) Length of second antennal segment equal to or greater than distance across one eye and narrowest portion of vertex (Fig. 1); large dark species with few markings on hemelytra; length over 4.5 mm.............................. 22

Length of second antennal segment less than distance across one eye and narrowest portion of vertex (Fig. 1); coloration and markings variable; length seldom over 4.2 mm....... 23

22(21) Very large, robust, elongate-oval species, length 5.5 to 6.5 mm., width 2.5 to 3.2 mm.; dorsum covered with short, reclining, shining, golden pubescence; mostly dull black dorsally with scattered light markings; anterior lobe of pronotum not particularly swollen, transverse impression distinct but not deep.. *Salda* (*Salda*) *lugubris* (Say), p. 24

More obovate and smaller than above, length 4.5 to 5.5 mm., width 2.0 to 2.5 mm.; dorsum with very neat, short, appressed, dull silvery pubescence; dull black dorsally with some light markings (Fig. 25); anterior lobe of pronotum swollen (bulbous), distinctly separated from head, and from posterior lobe by deep transverse impression ....*Saldula nigrita* Parshley, p. 17

23(21) Ovate; dark dorsally; eyespot usually fully developed; pruinose (bluish) areas around eyespot and inner margin of endocorium along clavus; without white "C" shaped mark at apex of exocorium; lateral margin of exocorium with light areas as in Fig. 13; length 3.0 to 3.9 mm ....*Saldula saltatoria* (Linnaeus), p. 20

Generally obovate; no pruinose markings; length 2.5 to 4.5 mm.; "C" shaped mark present or absent 24

24(23) Hemelytra velvety black or brownish-black; endocorium and clavus without distinct light markings (Figs. 11 & 29); length 2.5 to 3.2 mm................................ 25

Hemelytra not particularly velvety (color variable), or if velvety then over 3.2 mm long; usually with distinct light markings on endocorium and clavus 26

25(24) Lateral margin of endocorium with uninterrupted light stripe of nearly uniform width (Fig. 11) .... *Micracanthia fennica* Reuter, p. 10

Light lateral stripe not of uniform width and interrupted posteriorly (Fig. 29).... *Micracanthia ripula* Drake, p. 11

26(24) Head, pronotum scutellum, clavus and endocorium mostly black, partly shining, with short, scattered, silvery pubescence; distinct white spot medially at lateral margin of endocorium (Figs. 8-10 and 12); generally small, compact forms, ovate; length 2.5 to 3.2 mm.......... 27

Dorsal facies variable; usually without distinct white spot on endocorium as described above; larger species, more obovate; length over 3.0 mm 28

27(26) Exocorium mostly black with unpigmented areas interrupting black subbasally and preapically (Fig. 12); length 2.5 to 3.0 mm...................................... *Micracanthia quadrimaculata* (Champion), p. 10

Exocorium mostly unpigmented, with more or less well developed black area medially (wing eunomy Figs. 8-10); length 2.5 to 3.5 mm... *Micracanthia humilis* (Say), p. 11

28(26) Dorsum mostly black; exocorium interrupted by two unpigmented areas laterally; a more or less well-developed "C" shaped white mark apically at mesal margin of exocorium (Fig. 28); length 3.0 to 4.0 mm ....Micracanthia floridana Drake and Chapman, p. 10

Dorsum variable; exocorium with unpigmented areas not as above, and lacking "C" shaped mark 29

29(28) Lateral margin of exocorium never interrupted with dark markings; corium with three distinct whitish spots (see discussion, Fig. 24); dorsum with short appressed golden pubescence; length 3.2 to 4.0 mm ....Saldula opacula (Zetterstedt), p. 18

Lateral margin of exocorium usually interrupted with dark markings; white pigmented areas not distinct as above; length 3.0 to 4.5 mm.................................30

30(29) Pronotum sometimes with a light lateral margin; corium, membrane and apex of clavus usually light; lateral margin of exocorium with more or less well-developed dark areas apically and posterior to middle; a broad transverse "orange-colored" darkened area at apex of corium when viewed from a distance (wing eunomy Figs. 14-17); length 3.2 to 4.5 mm...Saldula ablusa Drake and Hottes, p. 14

Pronotum never with light lateral margin; hemelytra from almost completely light to very dark; exocorium with darkened area apically (indistinct in very light specimens), and 2 dark areas developing parallel to lateral margin but not touching margin except in darker specimens; development of markings in exocorium accompanied by darkening of endocorium; without "orange-colored" transverse band at apex of corium (see discussion); length 3.0 to 4.5 mm...Saldula "pallipes-palustris" group, p. 20

SUBFAMILY CHILOXANTHINAE

Pentacora Reuter

The species of the genus Pentacora are primarily halophilous. Four species occur in North America, of which one, Pentacora ligata (Say), has been collected in the Great Lakes region. The other three species are apparently largely restricted to the coastal areas, but some inland records are known, particularly from areas in the Mississippi River drainage (see Drake, 1949).

Pentacora hirta (Say) has been recorded from most of the Atlantic and Gulf Coast states as well as Indiana and Iowa (Drake, 1949). Pentacora signoreti (Guerin) shows a similar distribution, but is also known from the southern California coast and the Salton Sea. This species is usually found in saline situations, and is recorded by Froeschner (1962) from mineral springs in Boone and Jefferson Counties, Missouri. I have examined specimens of signoreti in the University of Michigan Museum of Zoology from Devil's Lake, North Dakota.

Pentacora sphacelata (Uhler) is the most restricted in habitat, occurring only along the coast, but it has the widest range. It occurs along the coast from Massachusetts to the Gulf Coast, southern California, the Caribbean, Peru, and the Mediterranean (Cobben, 1960b).

Pentacora ligata (Say), 1831

Figure 2

Discussion--*Pentacora ligata* has a dense, semi-erect dorsal vestiture which is not nearly as long as that in *hirta*; the dorsal vestiture of *spacelata* is shorter than in *ligata* and more appressed. The dorsum of *ligata* is only slightly shining as compared to the highly polished dorsum of *hirta*. The second antennal segment is no more than 2.5 times as long as the third in *ligata*, which will separate it from *signoreti* in which the second segment is nearly three times as long as the third.

Habitat preference--*Pentacora ligata* is a large and very agile species generally found on logs or large rocks in streams, and occasionally around standing water. It is often found in association with *Saldula confluenta* (Say).

Distribution--Records are known for most of the states east of the Mississippi River and for eastern Canada. I examined 59 specimens from Michigan collected between June 18 and September 17 and 111 specimens from Illinois, Indiana, Minnesota, New York, Ohio, Tennessee, Wisconsin, and Ontario collected between June 5 and September 1.

SUBFAMILY SALDINAE

TRIBE CHARTOSCIRTINI

Micracanthia Reuter

This genus is holarctic and includes species occurring both in Europe and North America. *Micracanthia fennica* Reuter (Fig. 11) occurs in Europe and is known from Oregon, Colorado and Nebraska; *Micracanthia quadrimaculata* (Champion) (Fig. 12) occurs in the western United States, extending into Central America, and I have seen specimens from as far east as South Dakota. These species have been illustrated and included in the keys.

Several species of *Micracanthia* occur in the Gulf Coast region. Among these are *pumpila* Blatchley, *husseyi* Drake and Chapman, and *drakei* Cobben which seem to be closely allied to *humilis* (Say) (see Cobben, 1960b, and Drake and Chapman, 1952, for discussion of these species).

Micracanthia floridana Drake and Chapman, 1953

Figure 28

Discussion--One of the largest species in the genus, *Micracanthia floridana* looks much like some of the *Saldula* species. The "C" shaped mark at the apex of the exocorium separates *floridana* from other members of the genus.

Habitat preference--*Micracanthia floridana* is usually found on logs or rocks and other objects hanging over streams or standing water. In the Great Lakes region associated species include *Saldula confluenta* and possibly *Pentacora ligata*.

Distribution--Originally described from specimens collected in Florida, Mississippi and Colorado (Drake and Chapman, 1953) records from Michigan represent an extension of the known range of this species.

Specimens examined--MICHIGAN: Emmet Co., Maple R. at Brutus Rd., T36N R4W Sec 24-25, 23 Jul 1966, T. Schuh, E. Evans, 1♂; Wexford Co., Sherman, Manistee R., T24N R24W Sec 31, 5 Sept 1966, E. Evans, 4♂, 2♀. FLORIDA: St. Augustine, Jan 1901, W. J. Gerhard, 1♀ (FM). ILLINOIS: Havana, Quiver L., Station F., 28 July 1894, 1♀ (INHS). NEW JERSEY: Camden, 1X: 18, S. T. Kemp, 1♀ (FM).

Micracanthia humilis (Say), 1831

Figures 8-10

Discussion--*Micracanthia humilis* is quite variable in size, ranging from 2.5 to 3.5 mm. in length. It is however rather uniform with respect to the pigmentation of the hemelytra (wing eunomy, Figs. 8-10). The white spot at the middle of the lateral margin of the endocorium and the elongate black area in the exocorium will separate *humilis* from other members of the genus occurring in the Great Lakes region. Cobben (1960b) and Drake and Chapman (1952) discuss closely allied species occurring in the Gulf Coast region.

Habitat preference--Damp sandy stream and pond margins are the most common habitats of *humilis*. It is usually found somewhat removed from the water in areas with small amounts of grasses and sedges. Species collected in association with *humilis* were *Saldula ablusa* Drake and Hottes and *Saldula* "*pallipes-palustris*".

Distribution--*Micracanthia humilis* is the most common member of the genus in eastern North America. It ranges from southern Canada into the Caribbean, and from the Atlantic coast west to the Rocky Mountains. I have examined 365 specimens from Michigan, Georgia, Illinois, Indiana, Iowa, Minnesota, North Carolina, North Dakota, Ohio, Tennessee, Wisconsin, and Florida; collection dates range from April 6 to October 21.

Micracanthia ripula Drake, 1958

Figure 29

Discussion--*Micracanthia ripula* is rather dark with heavy black pigmentation on the corium. The dorsum in general appears velvety brownish-black because of the thick pubescence. As with most members of the genus, a light area is generally present at the posterior end of the eyespot. The margin of the exocorium is light, interrupted submedially with black. A distinct light spot is present near the apex of the exocorium. *Micracanthia humilis* in the darker forms (Fig. 10) closely resembles *ripula*, but usually has a more well-developed eyespot and silvery, less dense dorsal vestiture; the dorsum of *humilis* is black and almost shining. The membrane of *humilis* is uniformly light, whereas the membrane of *ripula* is usually darker and blends into the corium anteriorly.

Habitat preference--Seven specimens were collected from two localities in Keweenaw County, Michigan. Both areas had a sandy substrate and some vegetative cover. This species seems to seek cover and darts out periodically. At a location near Lake Superior I found *ripula* in small clumps of moss in association with *Salda bouchervillei* (Provancher) and *Salda obscura* (Provancher). As is typical of *M. quadrimaculata* and *humilis, ripula* seeks damp to almost dry sandy substrates.

Distribution--Described from Churchill, Manitoba (Drake, 1958), *ripula* has also been recorded from Marble Canyon, Lilooet, and Kamloops, British Columbia (Scudder, 1961).

Specimens examined--MICHIGAN: Keeweenaw Co., Montreal R., T58N R30W Sec 14, 10 Jul 1966, T. Schuh, F. W. Stehr, 1♂, 1♀; Keweenaw Co., T57N R30W Sec 36, 10 Jul 1966, T. Schuh, F. W. Stehr, 3♂, 2♀.

Saldoida Osborn

Osborn (1901) erected the genus *Saldoida* to accept two North American species, *cornuta* Osborn and *slossonae* Osborn. Reuter (1912) placed this genus in a separate subfamily, the Saldoidinae. Drake and Chapman (1958) review *Saldoida*. Cobben (1959) places *Saldoida* in the Saldinae, under the tribe *Chartoscirtini*.

Saldoida turbaria, new species

Figures 5-7

Description--Small, slender, broadened posteriorly; mostly black with brown and white markings on the hemelytra; brachypterous.

Head--Black, shining, collar-like behind eyes; eyes conspicuously bulging; ocelli yellow, located at middle of vertex, separated by approximately the width of an ocellus; rostrum, labrum and tylus testaceous; rostrum extending between hind coxae; vertex and frons with numerous long, erect, black hairs; eyes conspicuously hairy under moderate magnification (25X).

Thorax--Black, shining, anteriorly with a distinct collar; lateral margins nearly straight with posterolateral angles produced, angulate; posterior margin straight at corners, shallowly and evenly concave around base of scutellum; dorsal surface of anterior lobe of pronotum elevated to form a pair of large erect conical tubercles, nearly as long as width of one eye measured across the vertex; dorsal surface of pronotum covered with erect black hairs; scutellum black, shining, with decumbent golden pubescence; posterior portion of scutellum elevated, glabrous.

Abdomen--Venter black, shining; second sternite densely clothed with decumbent golden pubescence; sternites three through six with scattered semi-erect golden pubescence; see Figure 6 for form of sixth abdominal sternite; ovipositor barely visible at tip of abdomen in ventral view.

Wings--Hemelytra reduced, brachypterous; sparsely covered with long, erect, black hairs, at least as long as the greatest diameter of the third antennal segment; outer margin of clavus dull black, inner margin ferrugineous; corium mostly fuscous with some lighter, nearly white areas; membrane and posterior part of corium shining black; membrane without visible venation; embolium whitish; margin around membrane nearly transparent.

Extremities--Antennae long, about two-thirds the length of body; segments one and two slender, flavous; segment two white apically, one and two with short, dark, decumbent, pubescence; segment three greatly enlarged, at least twice the diameter of segment two; segment four slightly smaller in diameter than three; segment 3 entirely black, segment 4 black basally and white apically; segments three and four with decumbent golden pubescence and longer, less dense, semi-erect black hairs.

Legs testaceous; coxae and basal half of femora light, apical portion of femora and entire tibia darker; all legs with short decumbent golden pubescence, all tarsi with short dark spines.

Measurements--Body length 3.2 mm.; body width 1.5 mm. Antennal proportions: I-35; II-60; III-60; IV-60.

Holotype--Brachypterous female; type locality: Michigan, Barry County, Purdy Bog, 3 miles ESE of Hickory Corners, T1N, R9W, Section 36, 29 July 1966, Toby Schuh Collector. Deposited in the Michigan State University Entomology Museum.

Paratype--Brachypterous female; same locality and collection data as holotype. In the collection of the author.

Discussion--This species, though described from only two female specimens, was deemed distinct enough to be given specific status. Comparison with specimens of *Saldoida cornuta* Osborn, which appears to be the most closely related species, indicates several important taxanomic differences. The eyes of *turbaria* are visibly hairy under moderate magnification (25X), the hairs being nearly as long as the diameter of the base of the second antennal segment; *Saldoida cornuta* has much shorter hairs on the eyes. The vestiture of the dorsum, especially the hemelytra, is distinct, being long, black, and erect, whereas in *cornuta* it is much shorter and more appressed. Other characters such as the coloration of the hemelytra and the antennae should eliminate any confusion with previously described species.

This new species is designated as "turbaria" to indicate its occurrence in a bog.

Habitat preference--Previous collections of Saldoida in the southeastern United States have been from low marshy areas where sundew plants and ecologically similar types of vegetation grow. The bog in the Great Lakes region is the situation which most closely approximates this type of habitat. Correspondence with Dr. John D. Lattin indicates that a nymph of the genus *Saldoida* was collected at Mud Lake, a bog, in Cheboygan County Michigan, in 1951. This specimen was secured from a burlese funnel sample while processing *Sphagnum* for *Ceratocombus* (Dipsocoridae). The nymph could not be identified to species and no adults were found by Lattin. I made collections at Mud Lake in July, 1966, and many large moss samples were taken, but no *Saldoida* were obtained. Later in July, the specimens herein described were obtained from Purdy Bog, in Barry County, Michigan. Because of its small size, secretive habits, and the difficulty of collecting in the bog mat, no additional specimens were obtained.

Saldoida turbaria was collected near the edge of the bog mat on a small muddy margin of the bog lake. The area was protected by higher vegetation growing at the mat edge, and received very little sunlight.

Numerous specimens of *Antillocoris minutus* (Bergroth) (Lygaeidae) and and *Hebrus burmeisteri* Lethierry and Severin (Hebridae) were collected in the *Sphagnum* in the area where *turbaria* was taken.

Behavior--*Saldoida turbaria* is not agile. Movements are jerky, giving the appearance of walking one leg at a time when the bug is crawling on the uneven mossy substrate. Short jumps of about one inch are made when the bug is disturbed. The antennae are in constant motion, being moved up and down alternately; this movement of the large antennae helps to locate the insects since they are very small and prefer shaded areas.

The legs are used by the insect to clean itself. The front legs are periodically brushed over the antennae. The two pairs of hind legs are rubbed against each other, especially the tibiae, and the hind legs are raised over the abdomen and stroked posteriorly. The bug periodically interrupts its wanderings and performs these cleaning motions.

Distribution--The genus *Saldoida* was previously considered to be primarily tropical and subtropical. The two species recorded from the United States, *cornuta* and *slossonae*, are confined mainly to the Gulf Coast region and the southern Atlantic Coast of the United States. The most northern collection records are for *slossonae* from Tuckahoe and Helmetta, New Jersey (Drake and Chapman, 1958). *Saldoida armata* Horvath is known from Taiwan and the Phillipines. *Saldoida turbaria* represents an extension of the known range of the genus in North America. The distribution of this new species should be roughly coincident with that of bogs in the Great Lakes region.

Saldula Van Duzee

Saldula is a cosmopolitan genus, and the largest and most diverse in the Saldidae. Eleven species are known from northeastern North America. The "*pallipes-palustris*" group contains examples which closely resemble the European species, *Saldula pallipes* (Fabricius) and *palustris* (Douglas). Separation of the North American forms of this group is extremely difficult and there is uncertainty as to the actual names which should apply to the New World forms.

Saldula ablusa Drake and Hottes, 1954

Figures 14-17

Discussion--*Saldula ablusa* appears to be very closely related to the *Saldula* "*pallipes-palustris*" group, and the very light forms of the two are often difficult to separate. *Saldula ablusa* has a somewhat broader pronotum and dorsally is covered with more golden pubescence than "*pallipes-palustris*". The pronotum often has a light lateral margin, a character not occurring in "*pallipes-palustris*". The light margin may be completely lacking or may be developed to the point where the pronotum is almost completely light posteriorly. Most specimens have light hemelytra, the darkest forms being about as dark as a moderately dark "*pallipes-palustris*". The hemelytra have an "orange" coloration and are usually opaque, whereas "*pallipes-palustris*" is usually yellowish in the light forms and the hemelytra are more translucent. When viewed from a distance, a darkened transverse band is apparent on the posterior part of the corium; this does not appear in "*pallipes-palustris*". The eyespot in *ablusa* is seldom outlined with dark pigment, but is set off by what appears to be a whitening of the outside ring against the general background coloration of the wing; "*pallipes-palustris*" begins to show a dark outline of the eyespot in the forms which are not heavily pigmented. A dark spot at the lateral margin of the hemelytra about two thirds of the way posterior on the exocorium is almost always well-developed, and occasionally a pigmented line appears anterior to the spot in the middle of the exocorium; "*pallipes-palustris*" has the lateral spot withdrawn from the wing margin and it does not become enlarged except in the darker forms. The second antennal segment varies from light apically to completely light; this character is usually more constant in "*pallipes-palustris*", the second segment being light apically and darkened elsewhere, with the entire segment only rarely entirely light. Refer to figures 14 through 17.

Habitat preference--*Saldula ablusa* occupies a habitat similar to that of "*pallipes-palustris*" and is most commonly found in association with it. All the collections I have made in Michigan were from the sandy shores of ponds and streams. The substrate is usually light colored, smooth, damp sand; most localities have a limited amount of scattered vegetation. The numbers of *ablusa* in a given habitat do not seem to be as great as those of "*pallipes-palustris*". The largest collection of *ablusa* was ten specimens from the Otter River in Baraga County, Michigan; about an equal number of "*pallipes-palustris*" were taken from this locality. Most collections show about a ten to one ratio of "*pallipes-palustris*" to *ablusa*. As with other species, *ablusa* is usually colored very similarly to the substrate, and they seem to seek an area in which they are best concealed. *Micracanthia humilis* was collected in association with *ablusa*.

Distribution--*Saldula ablusa* was described from Sand Point, Huron County, Michigan (Drake and Hottes, 1954). The distribution seems to be restricted primarily to the northeastern United States and Canada, but I have seen specimens from the northwestern United States which look very much like *ablusa*. Other similar species, such as *Saldula opiparia* Drake and Hottes occur in the western United States and more work will have to be done to determine if *ablusa* actually occurs in the west.

Specimens examined--MICHIGAN: Alger Co., Kingston L., W. of Grand Morais, 15 Jun 1966, F. W. Stehr, 5♂, 7♀; Baraga Co., Otter R., T51N R34W Sec 9, 10 Jul 1966, T. Schuh, F. W. Stehr, 4♂, 6♀; Benzie Co., Honor, 29 May 1966, E. Evans, 5♂, 6♀; Cedarville, 14 Jul 1955, G. E. Guyer, 2♂ (MSU); Cheboygan Co., (3♂, 6♀ from Douglas Lake area from 3 Jul to 30 Jul), (UK); Cheboygan Co., Douglas L., 4 Jul 1923, H. B. Hungerford, 1♀ (JTP); Cheboygan Co., Douglas L., 29 Jun 1923, H. B. Hungerford, 1♀ (JTP); Clinton Co., Park L., 10 Apr 1966, T. Hlavac, 1♀; Dickinson Co., Sturgeon R., T40N R28W Sec 23, 8 Jul 1966, T. Schuh, 1♂, 1♀; Emmet Co., Crooked L. at Conway, T35N R5W Sec 13, 23 Jul 1966, T. Schuh, E. Evans, 1♂; Emmet Co., 14 Jul 1935, M. Sanderson, 1♂, 1♀ (JTP); Grand Traverse Co., Boardman R., T26N R11W Sec 19, 22 Jul 1966, T. Schuh, E. Evans, 1♂; Hog Island, L. Michigan, 9 Jul 1939, H. B. Hungerford, 1♂ (UK); Houghton Co., Crystal L., T47N R36W Sec 2, 10 Jul 1966, T. Schuh, 1♀; Ingham Co., 24 Oct 1949, H. C. Chapman, 1♂, 1♀ (MSU); Keweenaw Co., Eagle R. at L. Superior, T58N R31W Sec 19, 9 Jul 1966, T. Schuh, F. W. Stehr, 1♀; Mackinac Co., Cut R. at L. Michigan, 17 Jun 1966, F. W. Stehr, 1♂, 1♀; Menominee Co., L. Michigan, T34N R25W Sec 20, 17 Jun 1966, F. W. Stehr, 1♂, 4♀; Ottawa Co., L. Macatawa, T5N R16W Sec 27, 24 Jun 1966, T. Schuh, 4♀; Roscommon Co., 24 Jun 1951, R. R. Dreisbach, 2♂, 1♀ (MSU); Schoolcraft Co., Clark's Ditch, 2 mi. W Seney, 8 Jul 1966, F. W. Stehr, 1♂, 1♀. ILLINOIS: Waukegan (beach), 23 Aug 1906, 4♂, 11♀ (INHS). INDIANA: Clark Jct., 21 May 1905, W. J. Gerhard, 1♂, 3♀ (FM); Clark Jct., 28 May 1905, W. J. Gerhard, 3♀ (FM). MINNESOTA: 3 mi. S. Afton, 5 May 1951, D. Scharff, 6♂, 2♀ (UM); Ball Club, Ball Club R., 3 Jul 1935, D. G. Denning, 1♂ (UM); Itasca St. Pk., 26 Jun 1958, L. R. Abra., 1♂ (UM); Pine Co., Mouth Snake R., 16 May 1959, 1♂ (UM); Ottawa, 18-19 Jul 1922, W. E. Hoffman, 1♀ (UM); Swan R., 2 Jul 1935, D. G. Denning, 1♀ (UM); Washington Co., Afton, 9 May 1959, 2♀ (UM). NEW YORK: Nassau Co., Jones Beach St. Pk., 28 Jun 1959, G. C. Eickwort, 1♀ (MSU). OHIO: Cleveland, 29 Jun 1934, M. W. Sanderson, 1♀ (UK). SOUTH DAKOTA: Custer St. Pk., 20 Jun 1955, R. L. Fischer, 1♂ (MSU). CANADA: Ontario, Prince Edward Co., Brimely, 24 Jul 1932, 1♀ (JTP).

Saldula comatula (Parshley), 1921

Figure 27

Discussion--Although this is primarily a western species I have included it to make the keys more complete. Saldula comatula and S. confluenta (Say) are the only "hairy" species which lack conspicuous hairs on the compound eyes. The wing pigmentation pattern and long hair on the second antennal segment and tibiae make comatula an easily recognized species. One western species, S. pexa Drake, resembles comatula very closely but has a slightly different wing pigmentation pattern and lacks the shaggy antennae and legs. Usinger (1956, p. 224) illustrates a specimen labeled as comatula, which is actually pexa.

Habitat preference--The habitat of comatula is unlike any of the other eastern "hairy" species in that it is generally found on open stream and pond margins of a muddy or sandy nature where little vegetation is present. I have collected this species in the west and have never found it in large numbers, but have found that it occurs with regularity along most pond and stream margins where the "pallipes-palustris" group is present.

Distribution--Originally described from British Columbia (Parshley, 1921), the known range of comatula now covers most all of the United States and Canada west of the Mississippi River. Harris (1937) records comatula from Batesland, South Dakota. This species might be found in the Great Lakes region when more intensive collecting is done.

Specimens examined--COLORADO: Dolores, 15 Aug 1925, C. J. Drake, 1♀ (UW). ILLINOIS: Illinois, Andreas Bolter Collection, 1♀ (INHS). NEBRASKA: Morrill Co., 22 Aug 1951, R. R. Dreisbach, 1♂ (MSU). SOUTH DAKOTA: Custer St. Pk., 20 Jun 1955, W. A. Drew, 1♀ (MSU).

Saldula confluenta (Say), 1831

Figure 26

Discussion--Saldula confluenta can be easily distinguished from all other members of the genus by its size, as it is usually over 5 mm. long, whereas most other species seldom exceed 4.5 mm. The long, erect dorsal vestiture and rather distinctive coloration pattern of the hemelytra are diagnostic.

Habitat preference--Saldula confluenta is usually found on rocks and logs in streams, or on rocks on the stream margin. Many fifth instar nymphs were running on a partially shaded black muddy bank of the Looking Glass River in Clinton County, Michigan in early June. No adults were collected at this locality but nymphs were reared through to adults in the laboratory in about four days. *Saldula confluenta* is seldom very numerous which makes collecting large numbers of specimens difficult. Little mention has been made of this species in the literature, probably because of its rather specialized habitat and great agility, both of which make it difficult to collect, and consequently rather uncommon in collections. *Pentacora ligata* is often collected in association with *confluenta*.

Distribution--Collection records indicate *confluenta* occurs over most of the northeastern United States, and I have taken specimens from all parts of Michigan. The most southerly and westerly record is from Texas (Froeschner, 1962). I have examined 63 specimens from Michigan collected between June 12 and September 8, and 25 specimens from Illinois, Minnesota, New York, Ohio, North Carolina, Tennessee, Wisconsin and Ontario collected between May 29 and August 8.

Saldula nigrita Parshley, 1921

Figure 25

Discussion--Typically quite large, *Saldula nigrita* ranges in length from 4.3 to 5.5 mm. Two forms seem to exist with respect to wing pigmentation. The most common type is dark, the corium being marked with a number of light spots; this is the only form that I have collected in Michigan. I have collected a lighter form in the Great Basin, the hemelytra of which are unpigmented except for the veins. The legs of *Saldula nigrita* are almost entirely black except for a light dorsal stripe on the femur. The second antennal segment is relatively longer than in closely related species (antennal proportions: II-19; III-12; IV-11). The relative length of the antennal segments and the dark legs will separate *nigrita* from the "*pallipes-palustris*" group. The dorsum is neat in appearance with only a small amount of silvery pubescence. *Saldula nigrita* might be confused with *Salda lugubris* (Say) but is much more slender and more obovate.

Habitat preference--*Saldula nigrita* has a rather specialized and well-defined habitat. Chapman (1962) notes *nigrita* occurring on stones in streams and on the shore; Lindberg (1958) collected it on sandy and stony banks of streams, and on pond and lake shores. At the two locations where this species was taken in Michigan, I found it on exposed rocks in streams and along stream margins. *Saldula nigrita* has a habit of crawling under rocks and then appearing momentarily, but never seems to sit in one exposed place on the substrate for an extended period of time.

Distribution--*Saldula nigrita* was described from Duncan, British Columbia (Parshley, 1921). Subsequent collecting has greatly extended the known range, indicating a boreal distribution. Records are known from Newfoundland (Lindberg, 1958) and as far south in the Rocky Mountain system as Carlsbad, New Mexico. The distribution pattern of *nigrita* is fairly common for the saldids of North America, particularly the genus *Salda*. Records for *nigrita* are known from stream mouths along the Pacific Coast in Oregon, and although this does not appear to fit the general distribution, the coastal climate is cool most of the year and not unlike the climatic conditions encountered in the mountains and northern latitudes in the summer.

Specimens examined--MICHIGAN: Baraga Co., Otter R., T51N R34W Sec 9, 10 Jul 1966, T. Schuh, F. W. Stehr, 31♂, 20♀; Dickinson Co., Sturgeon R., T29N R28W Sec 13, 12 Jul 1966, T. Schuh, 4♂, 6♀. MINNESOTA: Grand Marais, Devils Track R., 7 Aug 1927, W. C. Stehr, 6♂, 6♀ (UM).

Saldula opacula (Zetterstedt), 1840

Figure 24

Discussion--*Saldula opacula* closely resembles the "*pallipes-palustris*" complex, but can be separated rather easily when specimens are available for comparison. No dark pigmentation is present in the lateral portion of the exocorium. Some forms of "*pallipes-palustris*" can be confused with *opacula* because of the light wing margin, but the development of this light area is of a different nature than in *opacula*. The eyespot is always evident, the posterior portion being clouded with white, the anterior portion yellowish. The posterior part of the eyespot of "*pallipes-palustris*" does not have white pigmentation. A distinct white area occurs near the apex of the endocorium, just above the base of the second cell. An elongate, oval, white area is always evident subapically in the exocorium, lying mesad of the dark pigmented line which parallels the wing margin. In the typical pigmentation pattern the veins in the endocorium darken rather uniformly as the stripe paralleling the wing margin develops.

Habitat preference--A holarctic species originally described from Europe, *opacula* inhabits very wet places such as marshes and bogs. Lindberg (1958) notes collecting *opacula* from *Sphagnum*; I collected four specimens from the mossy banks of a stream in Kalkaska County Michigan. This species is seldom found in large numbers.

Distribution--The distribution of *opacula* is similar to that of *Saldula saltatoria* (Linnaeus) and apparently occurs over most of Canada and the northern United States.

Specimens examined--MICHIGAN: Baraga Co., Keweenaw Bay, T50N R33W Sec 1, 10 Jul 1966, T. Schuh, F. W. Stehr, 1♀; Cheboygan Co., 29 Jul 1918, R. F. Hussey, 1♂ (UMMZ); Cheboygan Co., 23 Jul 1955, R. R. Dreisbach, 1♀ (MSU); Cheboygan Co., 23 Jul 1952, H. B. Hungerford, 1♂, 1♀ (UK); Emmet Co., Petoskey, T35N R5W Sec 34, 23 Jul 1966, T. Schuh, E. Evans, 1♀ Huron Co., Point aux Barques, 17 June 1922, R. F. Hussey, 1♀ (UMMZ); Ingham Co., East Lansing, 26 Sept 1965, E. Evans, 1♂ (MSU) Ingham Co., East Lansing, 2 Nov 1963, R. B. Willson, 1♀ (MSU); Kalamazoo Co., Gull Lake Bio. Sta., 25 Jul to 7 Aug, 5♀, 2♂ (MSU); Kalkaska Co., Desmond Crk., T28N R8W Sec 28, 22 Jul 1966, T. Schuh, E. Evans, 2♂, 2♀; Livingston Co., E. S. George Reserve, 20 March 1938, J. J. Friauf, 2♀ (UMMZ); Mackinac Co., Cut R. at L. Michigan, 17 Jun 1966, F. W. Stehr, 1♂; Ontonogan Co., Sooty Crk., T50N R44W Sec 24, 11 Jul 1966, T. Schuh, 1♂; Van Buren Co., 8 May 1949, H. C. Chapman, 3♂, 1♀ (MSU). INDIANA: Clarke Jct., 7 Aug 1904, W. J. Gerhard, 2♀ (FM). MINNESOTA: Crookston (light trap), 19 Jul 1935, D. G. Denning, 1♀ (UM); Glenwood Park, 14 Aug 1925, G. O. Wiley, 1♀ (UM); Lancaster, 25 Jun 1937, D. G. Denning, 1♀ (UM); Mille Lacs Co., Mille Lacs, 18 May 1940, C. E. Mickel, 2♂, 1♀ (UM); Ottawa, 18-19 Jul 1922, W. E. Hoffman, 1♀ (UM); Ramsey Co., Golf Ponds, 1 Jun 1923, W. E. Hoffman, 1♂, 1♀

(UM); St. Anthony Park, 9 Jul 1923, H. H. Knight, 2♀ (UM); St. Paul, 1 Jul 1923, G. O. Wiley, 1♀ (UM); NEW YORK: Buffalo, Sept 1886, E. P. Van Duzee, 1♀ (ISU); Ithaca (at light), 1 Jul 1937, P. P. Babiy, 1♂ (CU). CANADA: Quebec, Huntington Co., Covey Hill, Allen Brook, 2 Jul 1966, D. Koss, 1♀ (MSU).

Saldula orbiculata (Uhler), 1875

Figures 19 & 21

Discussion--*Saldula orbiculata* is often brachypterous and in this form appears very "round". The six pruinose spots on the hemelytra, the distinctly rounded pronotal margins, and the long hairs on the second antennal segment and tibiae separate *orbiculata* from *Saldula severini* Harris which lacks the pruinose markings (Fig. 18), has a less rounded pronotum (Fig. 20) and shorter hairs on the antennae and legs.

Habitat preference--Both collections of *orbiculata* I made in Michigan were from very damp mossy areas. The Keweenaw County location was from a sandy margin of a cedar swamp which was covered with scattered clumps of moss; in Barry County specimens were taken from the *Sphagnum* mat near the edge of a bog lake. Wet areas of a permanent nature such as swamps, marshes, and bogs are required to support this species. The habits of *orbiculata* are much like those of *Saldula separata* (Uhler) in that it is seclusive and not very mobile. It was collected in association with *Salda bouchervillei* (Provancher), *Salda obscura* (Provancher) and *Micracanthia ripula*.

Distribution--The actual identity and distribution of *orbiculata* is rather confused. This is primarily a northeastern species, ranging west to the Rocky Mountains. Records are also known from Mexico (Champion, 1901). Records from Nevada (Chapman, 1962) and California (Uhler, 1875) are possibly misidentified specimens of *severini*. Further collecting will be necessary to clarify this point.

Specimens examined--MICHIGAN: Barry Co., Purdy Bog, T1N R9W Sec 36, 2 Aug 1966, T. Schuh, 2♀; Berrien Co., E. K. Warren Preserve, Warren Woods, 29 June 1919, R. F. Hussey, 1♀ (UMMZ); Berrien Co., New Buffalo, 30 June 1919, R. F. Hussey, 1♂ (UMMZ); Cheboygan Co., 13 Jul 1949, H. B. Hungerford, 1♀ (UK); Keweenaw Co., Little Betsy R., T57N R29W Sec 29, 10 Jul 1966, T. Schuh, F. W. Stehr, 1♀; Livingston Co., E. S. George Reserve, 22 July 1951, I. J. Cantrall, 1♂ (UMMZ); Mecosta Co., 27 June 1942, R. R. Dreisbach, 1♂ (UMMZ). COLORADO: Ute Pass, 9 Aug 1925, G. O. Wiley, 1♀ (UM). ILLINOIS: Galena, 5 Jul 1917, 1♀ (INHS); Havana, Quiver L., 9 Aug 1895, 1♀ (INHS); Quiver L., 14 Sept 1894, 1♀(INHS); Quiver L., 12 Oct 1894, 1♂ (INHS); Quiver L., Illinois R., 10 Nov 1894, 1♂ (INHS); Lake Forest (beach drift), 13 Jun 1906, J. G. Needham, 1♀ (UK). MINNESOTA: LaSueur, crk. 3-1/2 mi. SE, 13 Sept 1923, W. E. Hoffman, 1♂ (UM); Minneapolis, Glenwood Pk., 9 Jun 1924, G. O. Wiley, 1♂, 1♀ (UM); Nicollet Co., Barney Fay Ravine, 19 Sept 1923, W. E. Hoffman, 15♂, 17♀ (UM); Olmsted Co., C. N. Ainslie, 1♀ (UM). OHIO: Ironton, 26 May 1899, 1♂, 1♀ (OSU).

Saldula "*pallipes-palustris*"

Discussion--This species complex has confused the systematic heteropterists for some time, and many synonyms exist because of the extreme variability of the "species". Wagner (1950; reprinted in Usinger, 1956) gives a eunomic series of the European forms of *Saldula pallipes* (Fabricius), 1794, and *Saldula palustris* (Douglas), 1874. The use of the eunomic wing pattern is fairly reliable for separation of the species in Europe but as yet has not proved successful in North America. Cobben (1960b; also see 1960a for discussion of genitalia in separation of European forms) discusses the occurrence of "*palustris*" in the Netherlands Antilles, stating that although the hairs on the processus sensualis of the parameres are short, which would separate it from *pallipes* in Europe which has long hairs on the processus sensualis, the antillean specimens do not conform to the range of variation of *palustris* in Europe. *Saldula palustris* is primarily halophilous in Europe which is not the case with most of the specimens designated as *palustris* from North America. The parameres of those specimens I have examined from the Great Lakes region, which appear fromthe wing pattern to be *palustris*, are identical with parameres of specimens which appear to be *pallipes*. *Saldula ablusa* closely resembles the "*pallipes-palustris*" group (see discussion of *ablusa*). Differences in the parameres of "*pallipes-palustris*" and *ablusa* exist but their examination is not usually necessary for separation of the species.

Habitat preference--This form is ubiquitous, and has been collected throughout the Great Lakes region, and most of the rest of North America except for the seacoasts. Open stream and pond margins are the most common habitat and the general collector will usually encounter more representatives of this group than of all other species combined.

Distribution--I have examined over 1200 specimens from the Great Lakes region.

Saldula saltatoria (Linnaeus), 1758

Figure 13

Discussion--Appropriately named for its jumping habits, *Saldula saltatoria* is one of the more easily recognized species in the genus. The typical body form is robust, being distinctly broadest at a point near the apex of the scutellum. The hemelytra are uniformly darkly pigmented; the eyespot is always distinct, being pruinose, particularly medially and posteriorly. *Saldula orbiculata* is the only other species which has pruinose markings. The inner apical region of the endocorium also exhibits distinct pruinose markings. The dorsal vestiture is neat, consisting of short, golden pubescence on the pronotum and scutellum and some scattered areas on the hemelytra. *Saldula saltatoria* most closely resembles *orbiculata* and *severini* but lacks the long, shaggy dorsal vestiture. The European species *Saldula c-album* (Fieber) has been recorded from North America, but is probably an incorrectly identified form of *saltatoria*.

Habitat preference--*Saldula saltatoria* is generally found in damp, shaded areas along ponds and streams. The ground is usually covered with litter and is seldom exposed to direct sunlight. When disturbed *saltatoria* moves very quickly. The dark coloration makes observation difficult in the shaded habitat.

Distribution--Described from Europe, *saltatoria* is holarctic. It is found over most of North America and has been collected as far south as Guatemala (Champion, 1901). I have examined 35 specimens from the Lower Peninsula of Michigan collected between April 21 and August 17, and 23 specimens from Illinois, Indiana, Minnesota, New York, and Ontario collected between March 30 and November 14. I have also seen specimens from the northwestern United States.

Saldula separata (Uhler), 1878

Figures 22, 23

Discussion--*Saldula separata* is one of the few species in the genus which exhibits brachyptery. Of the 17 specimens I collected in Michigan, 6 were macropterous (4♂♂, 2♀♀) and 9 were brachypterous (2♂♂, 7♀♀). Figures 22 and 23 show the difference between brachypterous and macropterous forms. Figure 22 shows a wing with an abberant cell development in the membrane, a fairly common occurrence in the family. The hairy dorsum and eyes as well as the distinctive pigmentation of the hemelytra make this species easy to separate from other members of the genus. *Saldula illinoisensis* Drake is a synonym of *separata* (Polhemus, *in press*).

Habitat preference--This boreal species has a specialized habitat which makes collection and observation difficult. It is found in vegetation choked areas where the ground is covered with mosses and similar low growing vegetation. The substrate is usually damp to almost dry, with a high organic content. *Saldula separata* lies close to the ground and does not fly, but crawls and jumps short distances. This species was collected in association with *Salda obscura*.

Distribution--*Saldula separata* is nearctic and boreal. Scattered records are known for most of northeastern North America, the range extending from the Atlantic coast into the Rocky Mountains, and as far south as Colorado. The southern limit of the eastern part of the range appears to be roughly southern Illinois.

Specimens examined--MICHIGAN: Charlevoix Co., Dear Crk., near East Jordan, T32N R7W Sec 8, 22 Jul 1966, T. Schuh, E. Evans, 1♂, 3♀; Douglas L., 23 Jul 1927, H. B. Hungerford, 1♂ (UK); Grand Traverse Co., Marion Island, 25 July 1923, T. H. Hubbell, 2♂, 4♀ (UMMZ); Keweenaw Co., Montreal R., T58N R30W Sec 14, 10 Jul 1966, T. Schuh, F. W. Stehr, 2♀; Keweenaw Co., T57N R30W Sec 36, 10 Jul 1966, T. Schuh, F. W. Stehr, 1♂, 2♀; Manistee Co., 7-5-52, R. R. Dreisbach, 1♀ (MSU); Ontonogan Co., Sooty Creek, T50N R44W Sec 24, 11 Jul 1966, T. Schuh, 4♂, 4♀. ILLINOIS: N. Ill., Andreas Bolter Coll., 1♀ (INHS). MINNESOTA: St. Paul, 1 Jul 1923, G. O. Wiley, 2♀ (UM). NEW YORK: Adirondack Mts., Mt. Marcy, 9 Jul 1918, C. R. Crosby, 1♀ (CU). CANADA: Ottawa, Torre-Bueno Coll., 1♂, 1♀ (UK); Ontario, Sanford, 1906, 1♀ (CU).

Saldula severini Harris, 1943

Figures 18 & 20

Discussion--See discussion under *Saldula orbiculata* (Uhler).

Habitat preference--The habitat of *S. severini* is similar to that of *orbiculata*.

Distribution--Collection records indicate that *severini* is confined primarily to the Rocky Mountains and the western part of the Great Plains. Harris (1943) records specimens from Waubay, South Dakota and Palo Alto County, Iowa.

Specimens examined--SOUTH DAKOTA: Custer St. Pk., 20 June 1955, R. L. Fischer, R. W. Hodges, 2♂, 2♀ (MSU).

TRIBE SALDINI

Salda Fabricius

The genus *Salda* is holarctic with most of the species showing a boreal distribution. Reuter (1912) established the genus *Lampracanthia* to include a single species, *crassicornis* Uhler, and the genus *Teloleuca* to include a number of species, two of which occur in North America, *pellucens* (Fabricius) and *bifasciata* (Thompson). Cobben (1959) revised the status of the genus *Salda* and included in it *Lampracanthia* and *Teloleuca* as subgenera. This change of status was based on a study of the genitalia and other morphological characters, and consideration of the distribution and biology of the species concerned. Representatives of all three subgenera occur in the Great Lakes region, although apparent specificity of habitat makes them very difficult to collect.

Salda littoralis (Linnaeus), a European and Asian species, has been recorded from eastern North America in the literature. There is some question as to the validity of the name for this species in North America, but I have included it in the keys to make separation of the species easier (see Polhemus, *in press* for discussion).

Salda (*Teloleuca*) *bifasciata* (Thompson) (Fig. 4), a European, Asian, and western North American species has also been included in the keys for completeness.

Salda (*Salda*) *anthracina* Uhler, 1875

Discussion--*Salda anthracina* is uncommon in collections. As are most other members of this genus, *anthracina* is quite variable morphologically. It can be distinguished from *S. bouchervillei* (Provancher) by the companulate pronotum, which is only slightly explanate laterally. The antennae are stout (proportions - II-3, III-2, IV-2) whereas those of *bouchervillei* are quite slender (Fig. 30) (proportions - II-5, III-3, IV-3).

Habitat preference--Little is known about the habitat preference of *anthracina* because it is so uncommon. It apparently lives in situations similar to those preferred by *bouchervillei*.

Distribution--*Salda anthracina* was described from York County, Pennsylvania (Uhler, 1875). Drake and Hottes (1950) also record it from New Hampshire and New York. John Polhemus (correspondence) has examined specimens in the Drake Collection from New Jersey and Tennessee. I have seen one specimen from Berrien County, Michigan.

Specimens examined--MICHIGAN: Berrien Co., E. K. Warren Preserve, Warren Woods, 25 June 1919, R. F. Hussey, 1♀ (UMMZ). OHIO: Sugar

Grove, 17 May 1902, Herbert Osborn Collection, 1♀ (OSU). NEW YORK: Dryden, Ringwood, 6 Jul 1950, H. Dietrich, 5♀ (CU).

Salda (*Salda*) *bouchervillei* (Provancher), 1872

Figure 30

Discussion--*Salda bouchervillei* is one of the most common eastern species in the genus. The dorsum is shining black, with only scattered indistinct golden pubescence, whereas *S. buenoi* (McDunnough) has a dull black dorsum with only slightly shining appressed pubescence. The lateral pronotal margins are nearly straight and explanate posteriorly, *Salda anthracina* has a more companulate pronotum and less explanate lateral pronotal margins. Brachypterous specimens, which are the most common, are robust (length 5.5 to 6.5 mm., width 2.8 to 3.3 mm.) and convex dorsally; the margins of the hemelytra are evenly rounded and noticeably explanate anteriorly. Macropterous specimens are much more elongate (length 6.5 to 7.5 mm., width 2.8 to 3.3 mm.), the hemelytra appearing almost straight-sided. All antennal segments are uniformly colored, and usually very dark, whereas *buenoi* has a light second segment. The first segment has a light stripe on the interior edge; this stripe is sometimes very indistinct. *Salda anthracina* has stouter antennae with a light second segment, and in *S. obscura* (Provancher) the second antennal segment is dark with a light stripe dorsally. The legs are nearly uniformly colored, being almost without dark pigment in males and almost entirely black in the females.

Habitat preference--*Salda bouchervillei* inhabits marshy areas with dense vegetation. It is seclusive, hiding at the base of moss or grass clumps. When disturbed it darts out, but quickly seeks cover again. Most specimens are brachypterous and flight is therefore uncommon.

Distribution--*Salda bouchervillei* has a range similar to that of *S. obscura*, but it does not appear to occur in the northwestern United States. Drake and Hottes (1950) cite records from Alaska, New Mexico, and Tennessee. The New Mexico records are probably incorrectly identified specimens of *Salda buenoi*.

Specimens examined--MICHIGAN: Bay Co., 18 Jun 1950, R. R. Driesbach, 1♂, 1♀ (MSU); Berrien Co., E. K. Warren Reserve, Sawyer Dunes, 24 June 1919, T. H. Hubbell, 1♀ (UMMZ); Berrien Co., E. K. Warren Reserve, Warren Woods, 15 July 1920, T. H. Hubbell, 1♂ (UMMZ); Charlevoix Co., Garden Island, 28 July 1920, S. Moore, 1♀ (UMMZ); Charlevoix Co., High Island, 14 June 1922, S. Moore, 1♀ (UMMZ); Charlevoix Co., High Island, 7 July 1922, S. Moore, 1♀ (UMMZ); Cheboygan Co., 18 Jul 1931, H. B. Hungerford, 1♂ (UK); Cheboygan Co., 24 Jul 1930, H. B. Hungerford, 1♀ (UK); Cheboygan Co., Douglas L., 22 June 1925, C. F. Byers, 1♀ (UMMZ); Cheboygan Co., Monroe L., on beach, July 1930, J. Kigis, 1♂, 1♀ (UMMZ); Cheboygan Co., Mud L. Bog, T38N R3W Sec 7, 24 Jul 1966, T. Schuh, E. Evans, 2♂, 1♀; Emmet Co., Petoskey, T35N R5W Sec 34, 23 Jul 1966, T. Schuh, E. Evans, 1♂; Keweenaw Co., Little Betsy R., T57N R29W Sec 29, 10 Jul 1966, T. Schuh, F. W. Stehr, 10♂, 9♀; Keweenaw Co., T57N R30W Sec 36, 10 Jul 1966, T. Schuh, F. W. Stehr, 4♂, 6♀; Mackinac Co., Naubinway, 24 June 1921, S. Moore, 1♀ (UMMZ); Marquette Co., Peshekee R., T48N R30W Sec 25, 9 Jul 1966, T. Schuh,

F. W. Stehr, 1♂, 1♀; Oakland Co., Milford, 22 June 1921, T. H. Hubbell, 1♂ (UMMZ); Ontonogan Co., Union R. at L. Superior, 11 Jul 1966, T. Schuh, 1♂. COLORADO: Sedalia, 18 Jul 1962, J. T. Polhemus, 1♂, 1♀ (TS). INDIANA: Pine (lake beach), 28 May 1905, W. J. Gerhard, 1♂, 2♀ (FM); Wolf L., 11 Jun 1911, A. B. Wolcott, 1♂ (FM). ILLINOIS: Chicago, 5 Jun 1904, W. J. Gerhard, 1♀ (FM); Chicago, Avalon Park, 15 Jun 1933, W. J. Gerhard, 1♀ (FM); Chicago, Dauphin Park, 19 Jun 1920, A. B. Wolcott, 1♀ (FM); S. Chicago, 7 Jul 1907, W. J. Gerhard, 1♂, 1♀ (FM); South Chicago, 5 Jun 1910, A. B. Wolcott, 1♀ (FM); N. Ill., Andreas Bolter Coll., 4♀ (INHS); Urbana, 1 Jun 1889, Hart Coll., 2♀ (INHS). IOWA: Lake Park, 12 Jun 1948, T. Polhemus, 1♂ (FM). MINNESOTA: Chisago Co., Rus Beach, 3 Jun 1900, Otto Lugger Coll., 4♀ (UM); Ottertail Co., Otto Lugger Coll., 1♀ (UM). NEW YORK: N. Fairhaven, 4-?-21, 1♀ (CU). NORTH DAKOTA: Devil's L., 23 July 1920, 4♀ (M); Nelson Co., Stump L., 24 July 1920, T. H. Hubbell, 1♀ (UMMZ).

Salda (Salda) buenoi (McDunnough), 1925

Discussion--*Salda buenoi* and *Salda bouchervillei* are very similar in size and shape. The dorsum of *buenoi* is a dull black with appressed, slightly shining pubescence, whereas *bouchervillei* is highly polished and almost devoid of pubescence (Fig. 30). *Salda littoralis* can be separated from *buenoi* by its dense, shining, golden pubescence.

Habitat preference--*Salda buenoi* is found in damp areas with sedge and grass cover. It is often in more exposed areas than *bouchervillei*, on sandy or muddy margins of streams and ponds, in a habitat similar to *S. lugubris* (Say).

Distribution--*Salda buenoi* has been recorded from Washington, Oregon, California, Idaho, Nevada, Montana, Colorado, Utah, Nebraska, North Dakota, South Dakota, Iowa, Illinois, Wisconsin, Michigan, Massachusetts, New Hampshire, British Columbia, Alberta, Saskatchewan, Ontario (Drake and Hottes, 1950) and Newfoundland (Lindberg, 1958). Polhemus (correspondence) has seen specimens from Arizona.

Specimens examined--COLORADO: Hygiene, 12 May 1963, John T. Polhemus, 1♂, 1♀ (TS). UTAH: Uba Dam, Sevier R., B. Moore, 1♀ (UMMZ).

Salda (Salda) lugubris (Say), 1831

Discussion--The generic position of *Salda lugubris* has been much disputed. Cobben (1959) places it in *Salda*, rather than *Saldula* where it was previously placed, because of the cell structure of the membrane. The inner cell of the membrane is produced no more than one-fourth of its total length beyond the base of the second cell, whereas the rest of the members of the genus have the inner cell produced about one-third of the total length. Drake and Hottes (1950) mention that both long- and short-winged forms are common, but I have never seen a brachypterous specimen. *Salda lugubris* most closely resembles the macropterous form of *buenoi*, but can be separated from it by the difference in the cells of the membrane. The pubescence of *lugubris* is more dense and golden than that of *buenoi* and *Saldula nigrita*. *Salda lugubris* is much more robust than *nigrita*. *Saldula major* (Uhler) is a synonym of *lugubris*.

Habitat preference--The typical habitat is a sandy shore of a pond or stream with some emergent vegetation, usually sedges or grasses. *Salda lugubris* was collected on the shore of Lake Superior in Baraga County, Michigan, hiding in the matted sedges on the sandy lake shore. The species runs and flies very rapidly when disturbed. Wiley (1922) reared *lugubris* and gives a brief life history of it.

Distribution--*Salda lugubris* has a rather atypical distribution for the genus. Drake and Hottes (1950) record this primarily eastern North American species from as far west as British Columbia, Utah and New Mexico. The southern range of *lugubris* is much greater than any other member of the genus. I have examined one specimen from Florida. I have examined 38 specimens from Michigan collected between June 12 and Aug 12, and 56 specimens from Florida, Illinois, Indiana, Massachusetts, Minnesota, Montana, New York, Wisconsin and Ontario collected between April 9 and Oct 2.

Salda (*Salda*) *obscura* (Provancher), 1872

Discussion--*Salda obscura* is one of the smallest members of this subgenus (length 3.8 to 5.6 mm., width 1.7 to 2.6 mm.). The dorsum is shining black and almost devoid of pubescence, which separates it from *littoralis* which has dense, shining, golden pubescence. The lateral margins of the pronotum are very straight, and the lateral margins of the hemelytra only slightly rounded, giving the appearance of being widened posteriorly. All of the specimens I have examined have been brachypterous. The antennae are covered with short, golden, subappressed pubescence and some longer erect dark hairs. The first and second antennal segments are light dorsally and black ventrally; antennal segments three and four are entirely black; *bouchervillei* has a completely dark second segment and in *littoralis* the second segment is entirely light. Antennal proportions are: II-20; III-14; IV-14. The legs are mostly light, the femora have a dark "saddle" apically; The amount of dark pigmentation is, however, quite variable.

Habitat preference--Collections from Michigan have shown *obscura* to live on fairly dry ground, with some vegetation. In Keweenaw County, Michigan it was collected on sandy areas at the edge of a cedar swamp; both *obscura* and *bouchervillei* were present in this habitat. The substrate was covered with scattered clumps of mosses with sundew plants growing in them; the saldids were found hiding in the moss clumps and would dart out periodically. Locations where I have collected *obscura* in Oregon were damp, sandy slopes near streams. The saldids, often present in large numbers, were found running among the low, scattered vegetation. Lindberg (1958) notes collecting *obscura* on marshes with *Spagnum-Carex-Myrica* and *Carex-Juncus*, on riverbanks, and on the seashore. *Saldula separata* and *Micracanthia ripula* were collected in association with *obscura*.

Distribution--*Salda obscura*, like most other members of the genus, is a true boreal form, and has been collected in the mountains in British Columbia, Washington, Oregon, Nevada, Colorado (Chapman, 1962), British Columbia and Washington. Lindberg cites collections from Newfoundland, Quebec, Alberta and Alaska. All records from Michigan are from areas near the southern shore of Lake Superior.

Specimens examined--MICHIGAN: Keweenaw Co., T57N R30W Sec 36, 10 Jul 1966, Toby Schuh, F. W. Stehr, 1♂; Keweenaw Co., Little Betsy R., T57N R29W Sec 29, 10 Jul 1966, Toby Schuh, F. W. Stehr, 1♂, 2♀;

Ontonogan Co., Sooty Crk., T50N R44W Sec 24, 11 Jul 1966, Toby Schuh, 1♂; Ontonogan Co., Mineral R. at L. Superior, 11 Jul 1966, Toby Schuh, 1♀. OREGON: Umatilla Co., 5 mi. W. Tollgate, el. 4000 ft., 11 Jul 1964, J. D. Lattin, Toby Schuh (TS); Union Co., 6 mi., E. Tollgate, el. 4900 ft., 12 Jul 1964, J. D. Lattin, Toby Schuh (TS).

Salda (*Lampracanthia*) *crassicornis* Uhler, 1875

Discussion--This species is easily distinguished from other members of the genus by its small size (length 3.0 to 3.5 mm.) shining black dorsum and sparse erect vestiture. Most specimens are brachypterous but macropterous forms have been taken (Slater, 1955).

Habitat preference--Slater (1955) notes taking *Salda crassicornis* in a marshy area adjacent to the Niobrara River, at Valentine, Nebraska. Many specimens were found by Slater on matted marsh grass and sedge in water from ankle to knee depth. Lindberg (1958) collected *crassicornis* in Newfoundland on humid marshes, swamps with *Carex* and *Myrica* and on the shores of spagnum pools.

Distribution--Although *crassicornis* has not been collected in Michigan it should occur here. Records from the literature and available collections indicate a boreal distribution. Blatchley (1926) collected four specimens on the shore of Lake Tippacanoe, Koscinsko County, Indiana, between June 7 and 9.

Specimens examined--NEW YORK: Dryden, Ringwood, 6 Jul 1950, H. Dietrich, 2♂ (CU).

Salda (*Teloleuca*) *pellucens* (Fabricius), 1779

Figure 3

Discussion--The holarctic subgenus *Teloleuca* has two species which occur in North America, *pellucens* (Fabricius) and *bifasciata* (Thompson). The dorsal facies more closely resembles that of *Saldula* than the typical *Salda* (Figs. 3 & 4). *Salda pellucens* can be easily separated from *bifasciata* by the presence of a light quadrangular area at the lateral apex of the endocorium (Fig. 3), whereas there is only a small white spot at this location in *bifasciata* (Fig. 4).

Habitat preference--*Salda pellucens* is most often collected along gravel or sand stream margins, but may occur some distance from permanent water. It seems to be very positively phototrophic and does not remain in the open unless there is bright sunlight.

Distribution--This species is strictly boreal and occurs across most of Canada and the northern United States as well as in Europe and Russia (Drake, 1952). Records are known from Essex Co., New York (Blatchley, 1926; cited as *Chartoscirta* (*Chartolampra*) *cursitans* Bueno), Montana, Colorado and northern Wisconsin. I have examined specimens collected by J. T. Polhemus at Weston Pass, Colorado. It should occur in Michigan. Harold Chapman collected a specimen in Lakewood, Wisconsin.

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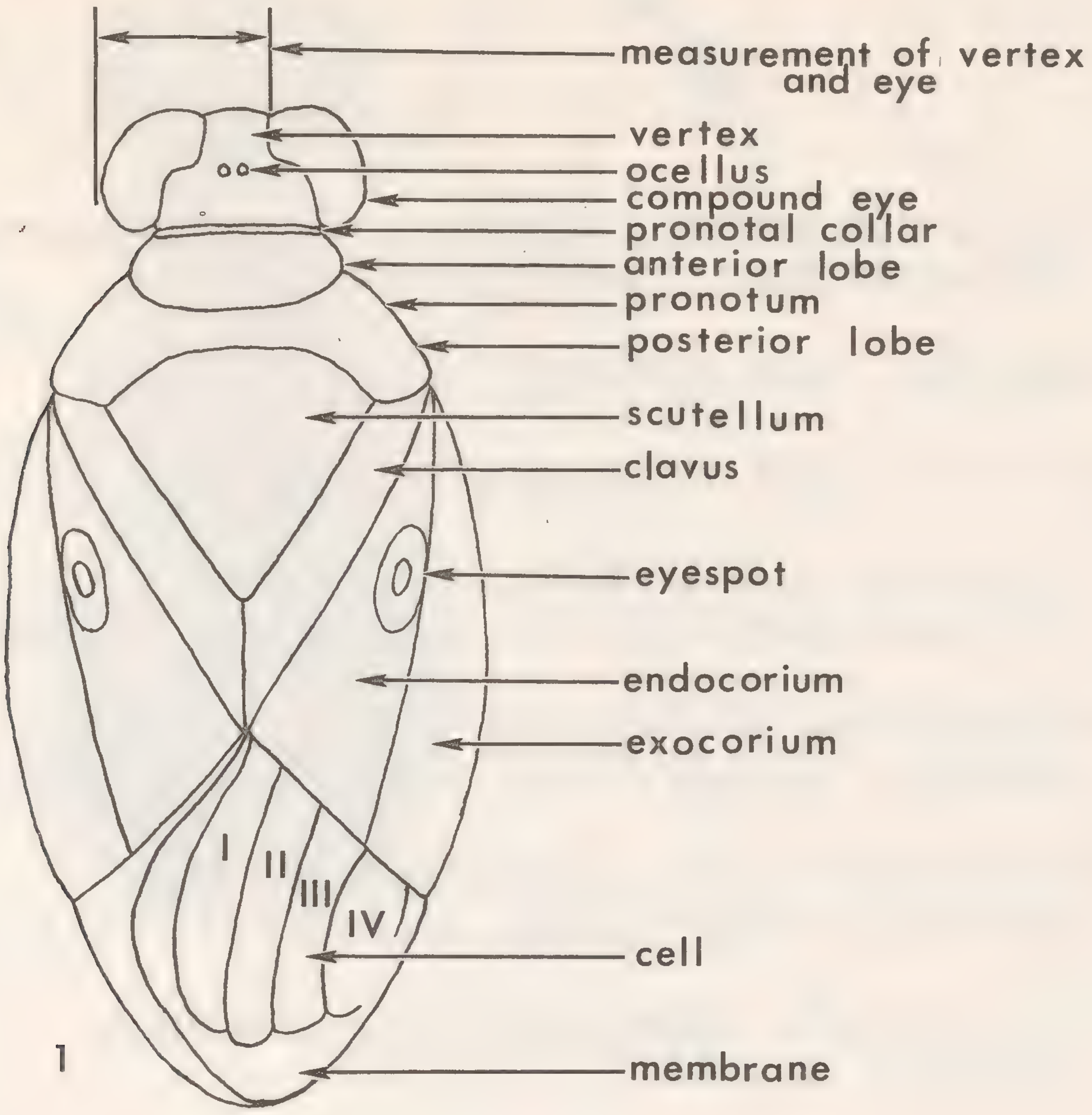

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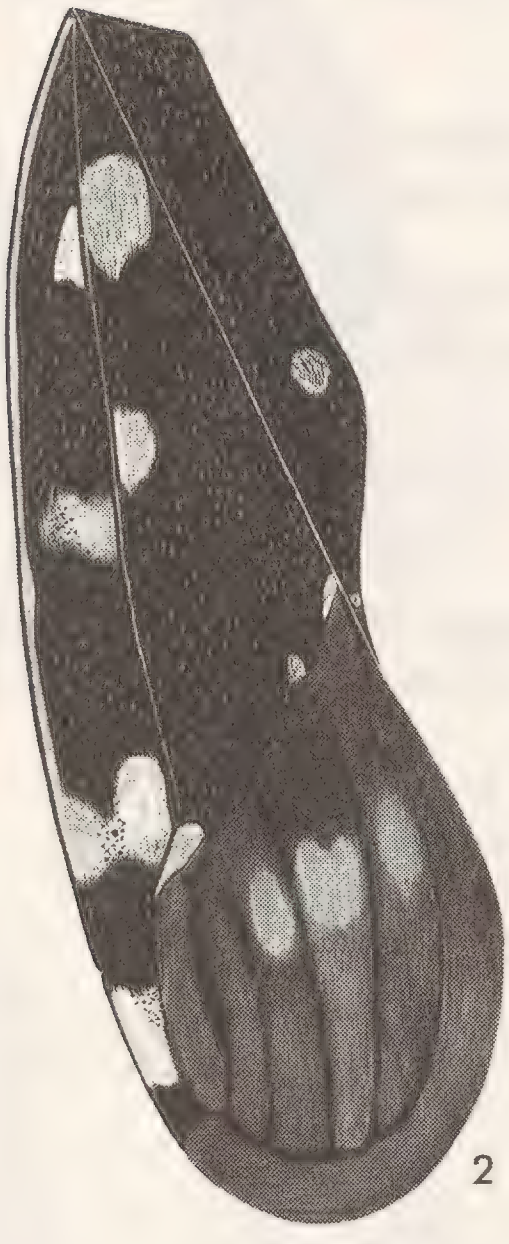

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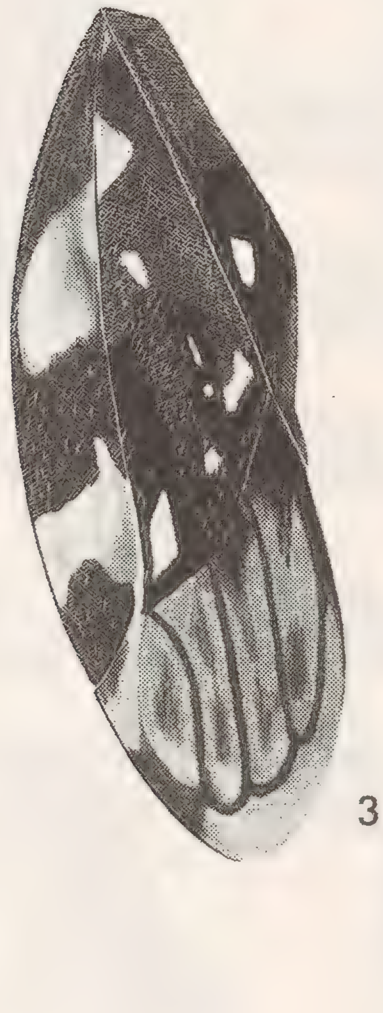

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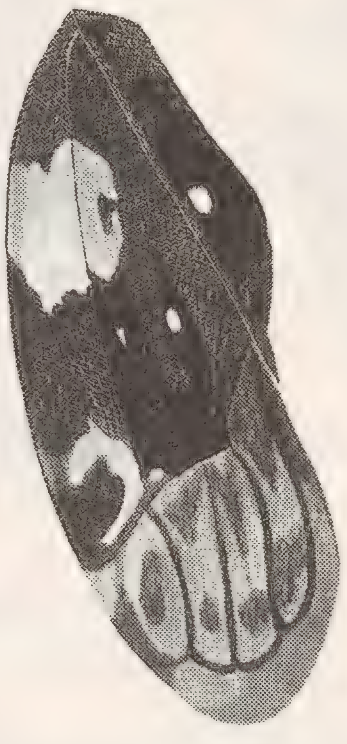

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Fig. 1.--General morphological details. Fig. 2.--Left hemelytron, Pentacora ligata (Say). Fig. 3.--Left hemelytron, Salda (Teloleuca) pellucens (Fabricius) ♂ (Colorado, Weston Pass). Fig. 4.--Left hemelytron, Salda (Teloleuca) bifasciata (Thompson) ♂ (Washington, Mt. Ranier National Park).

Fig. 5.--General dorsal habitus, *Saldoida turbaria* new species ♀
(Michigan, Barry County, Purdy Bog)

Fig. 6.--Lateral view, head and thorax, *Saldoida turbaria* ♀

Fig. 7.--Ventral view, apex of abdomen, *Saldoida turbaria* ♀

Fig. 8.--Left hemelytron, *Micracanthia humilis* (Say) ♀
(Michigan, Gratiot County, Maple River at Banister)

Fig. 9.--Left hemelytron, *Micracanthia humilis* (Say) ♀
(Michigan, Gratiot County, Maple River at Banister)

Fig. 10.--Left hemelytron, *Micracanthia humilis* (Say) ♀
(Michigan, Gratiot County, Maple River at Banister)

Fig. 11.--Left hemelytron, *Micracanthia fennica* Reuter ♀
(Colorado, Hartsel)

Fig. 12.--Left hemelytron, *Micracanthia quadrimaculata* (Champion) ♂
(Oregon, Baker County, 4 miles W. Baker, North Powder River)

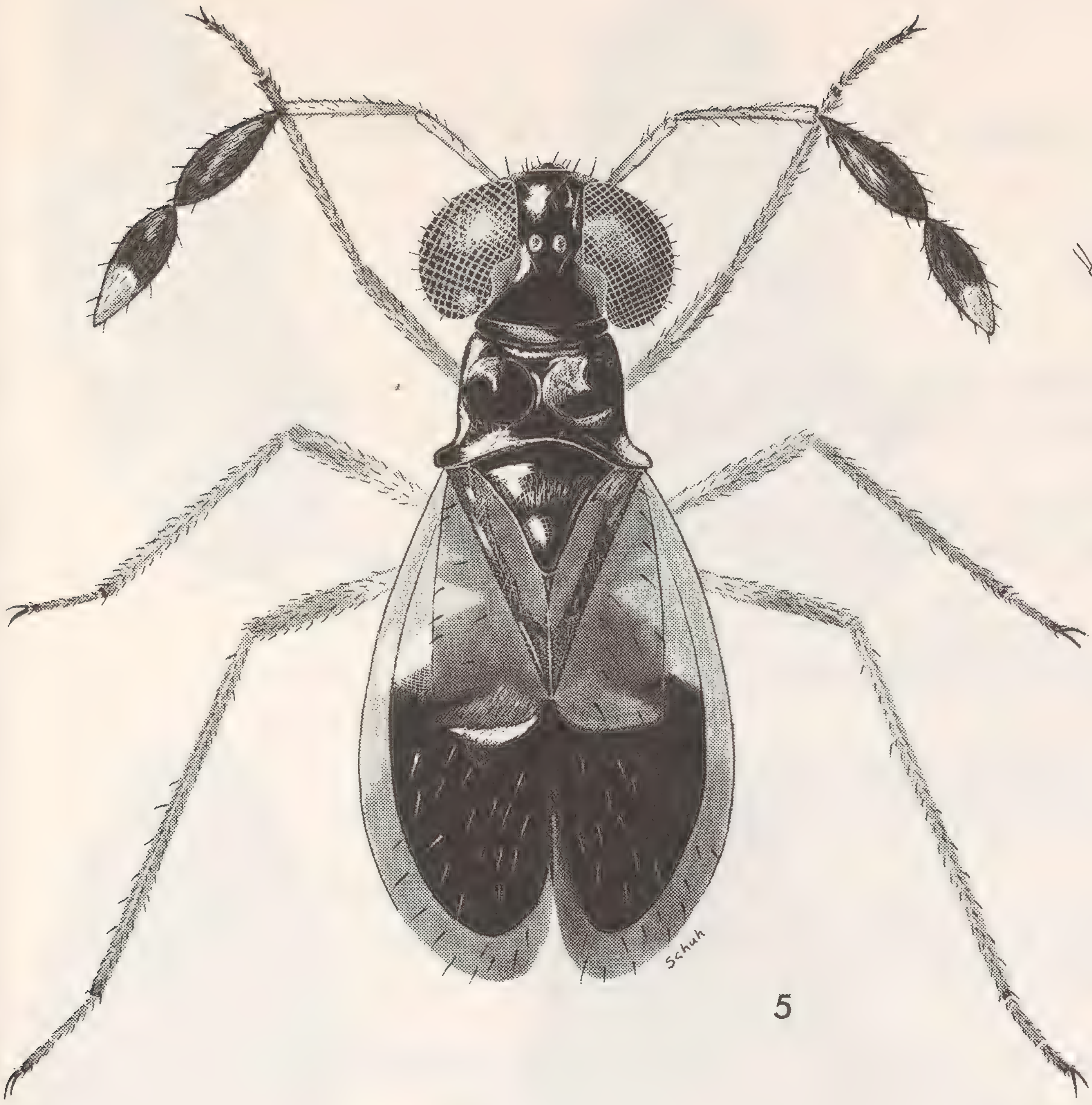
Fig. 13.--Left hemelytron, *Saldula saltatoria* (Linnaeus) ♂
(Michigan, Shiawassee County, Rose Lake Exp. Station)

Fig. 14.--Left hemelytron, *Saldula ablusa* Drake and Hottes ♀
(Michigan, Cheboygan County, Douglas Lake)

Fig. 15.--Left hemelytron, *Saldula ablusa* Drake and Hottes ♀
(Michigan, Emmet County)

Fig. 16.--Left hemelytron, *Saldula ablusa* Drake and Hottes ♂
(Michigan, Alger County, Kingston Lake)

Fig. 17.--Left hemelytron, *Saldula ablusa* Drake and Hottes ♀
(Michigan, Menominee County, T34N R25W Section 20)



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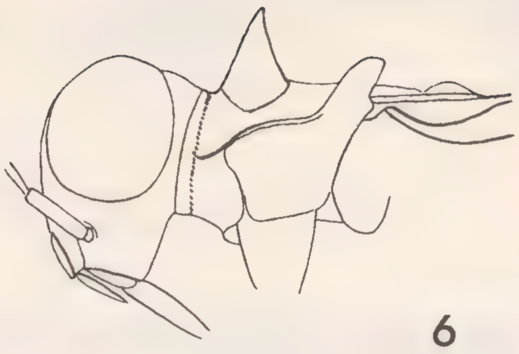

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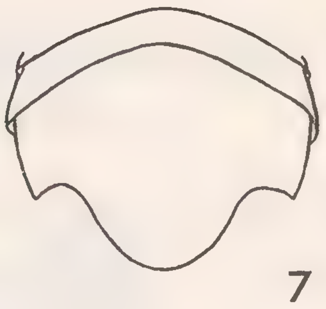

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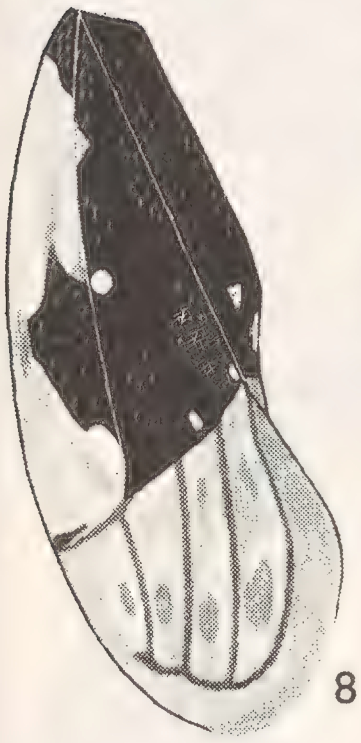

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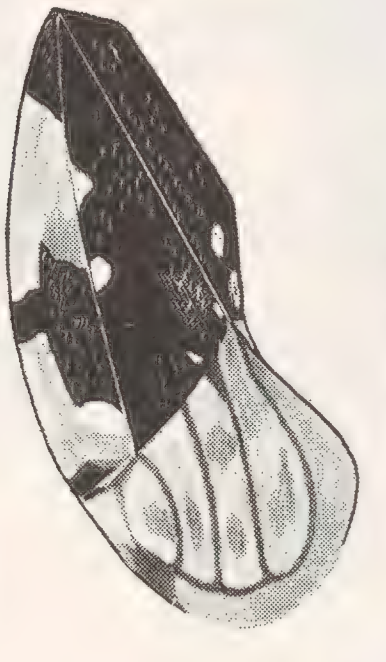

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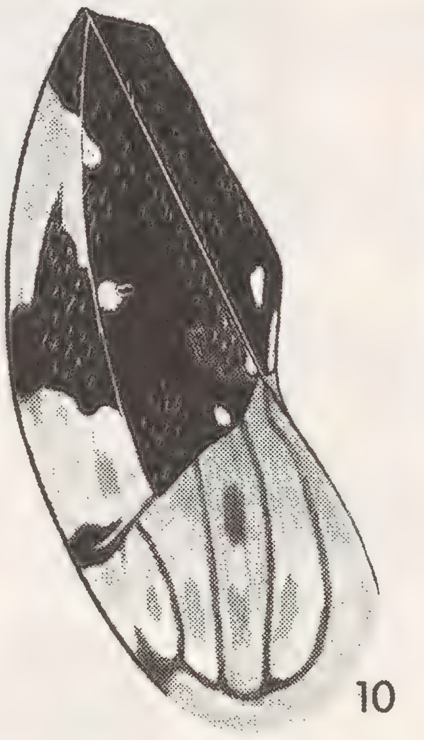

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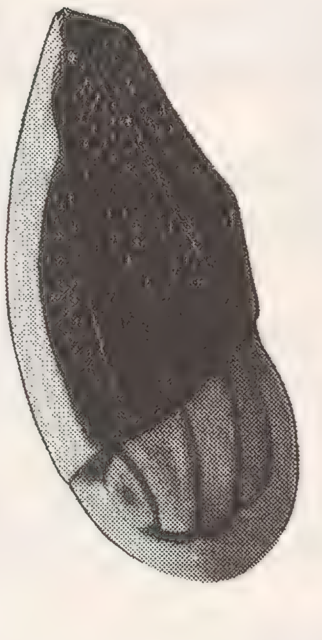

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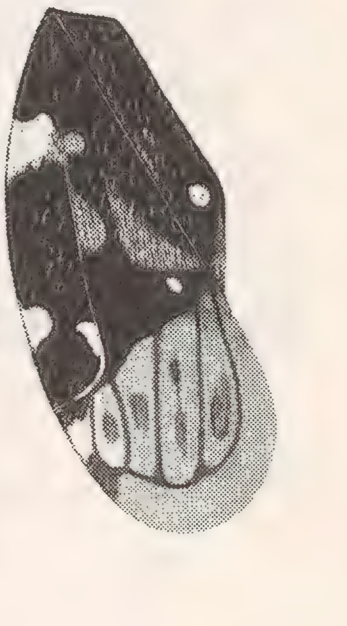

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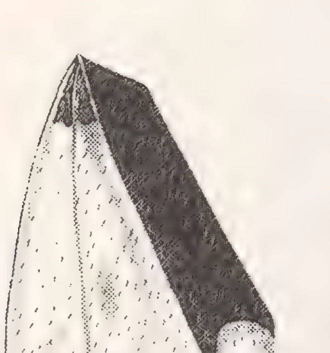

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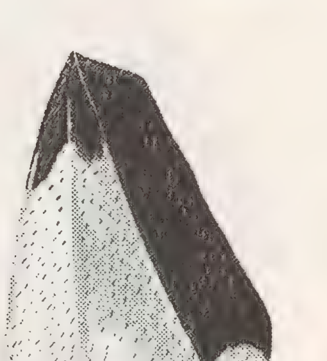

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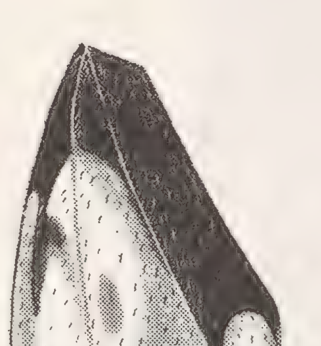

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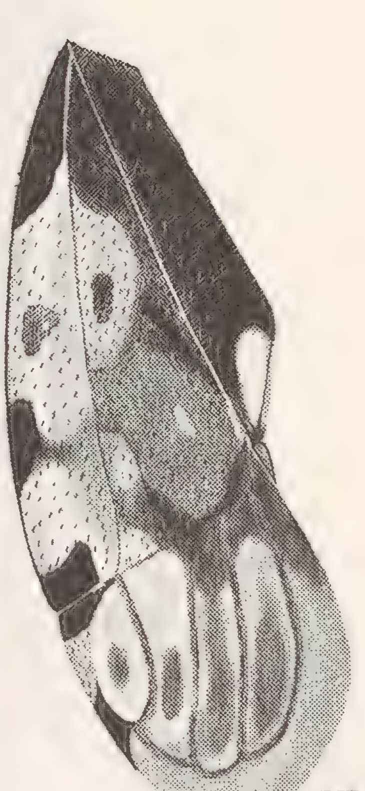

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Fig. 18.--Left hemelytron, *Saldula severini* Harris ♂ (South Dakota, Custer State Park)

Fig. 19.--Left hemelytron, *Saldula orbiculata* (Uhler) ♀ (Michigan, Keweenaw County, Little Betsy River)

Fig. 20.--Pronotum, *Saldula severini* (Harris) ♂ (South Dakota, Custer State Park)

Fig. 21.--Pronotum, *Saldula orbiculata* (Uhler) ♀ (Michigan, Keweenaw County, Little Betsy River)

Fig. 22.--Left hemelytron, *Saldula separata* (Uhler) ♀ macropterous (Michigan, Keweenaw County, Montreal River, T58N R30W Section 14)

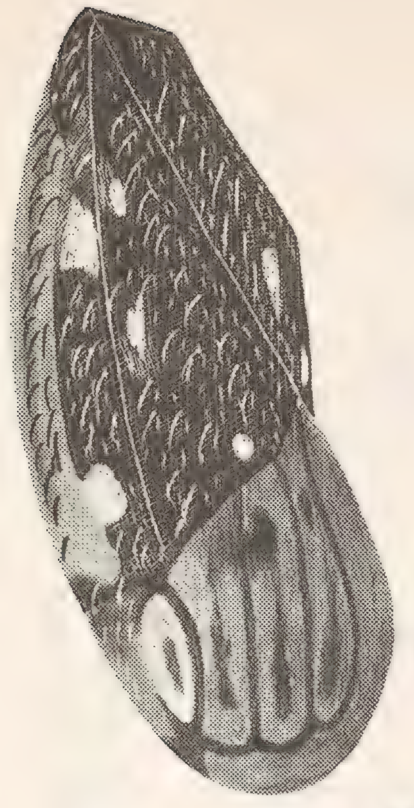
Fig. 23.--Left hemelytron, *Saldula separata* (Uhler) ♀ brachypterous (Michigan, Ontonogan County, Sooty Creek, T50N R44W Section 24)

Fig. 24.--Left hemelytron, *Saldula opacula* (Zetterstedt) ♂ (Michigan, Kalkaska County, Desmond Creek)

Fig. 25.--Left hemelytron, *Saldula nigrita* Parshley ♂ (Michigan, Baraga County, Otter River)

Fig. 26.--Left hemelytron, *Saldula confluenta* (Say) ♂ (Michigan, Emmet County, Maple River at Brutus Road)

Fig. 27.--Left hemelytron, *Saldula comatula* (Parshley) ♂ (California, Siskiyou County, Medicine Lake)



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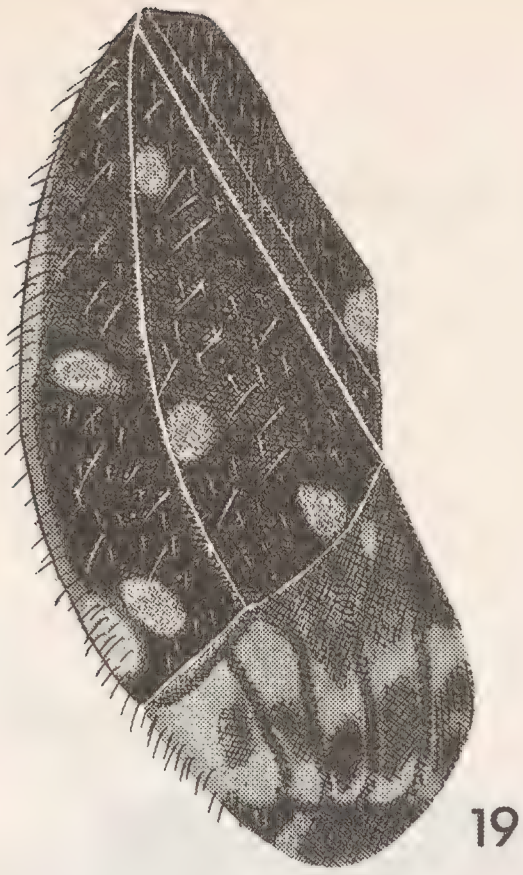

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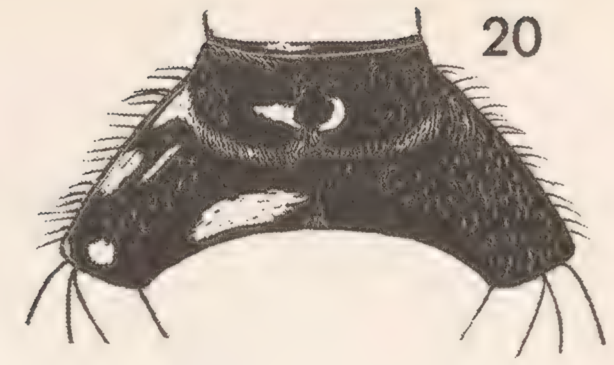

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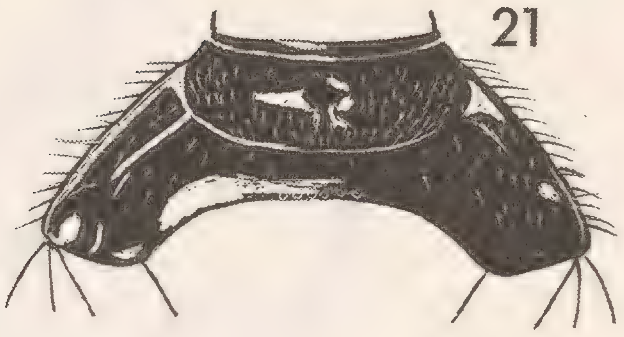

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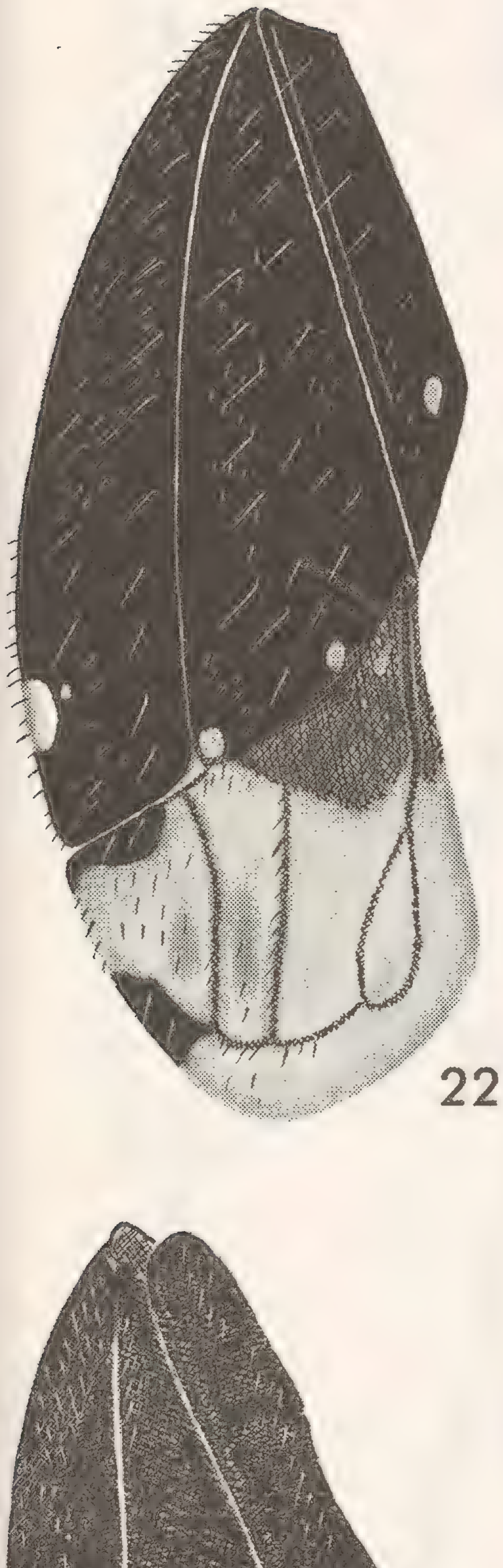

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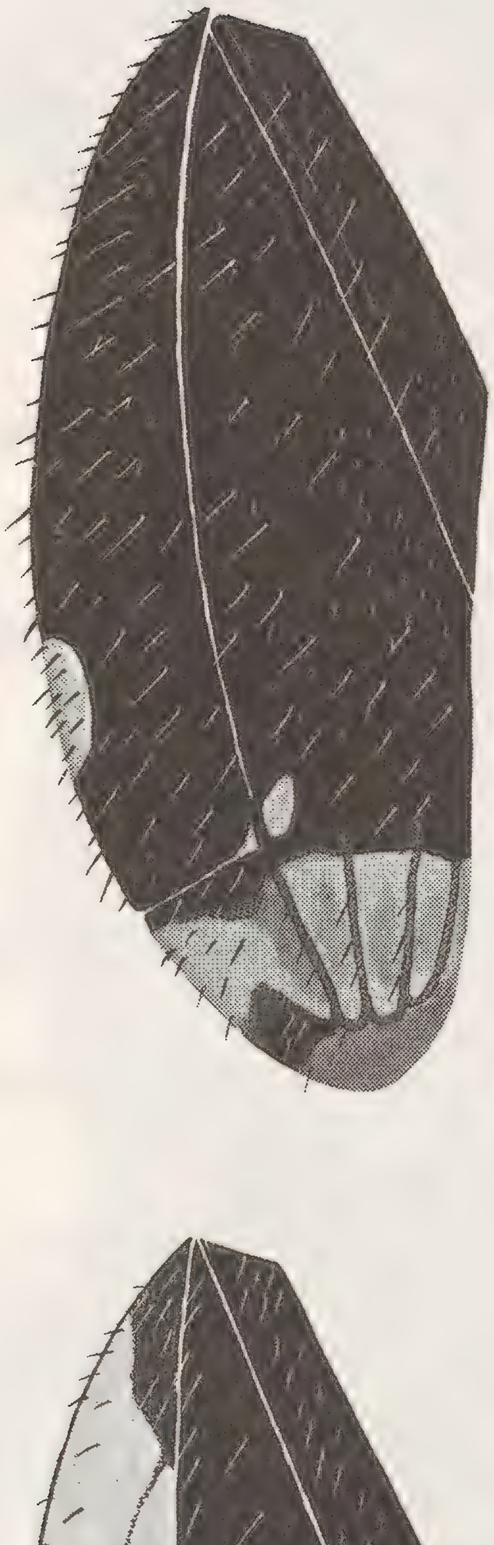

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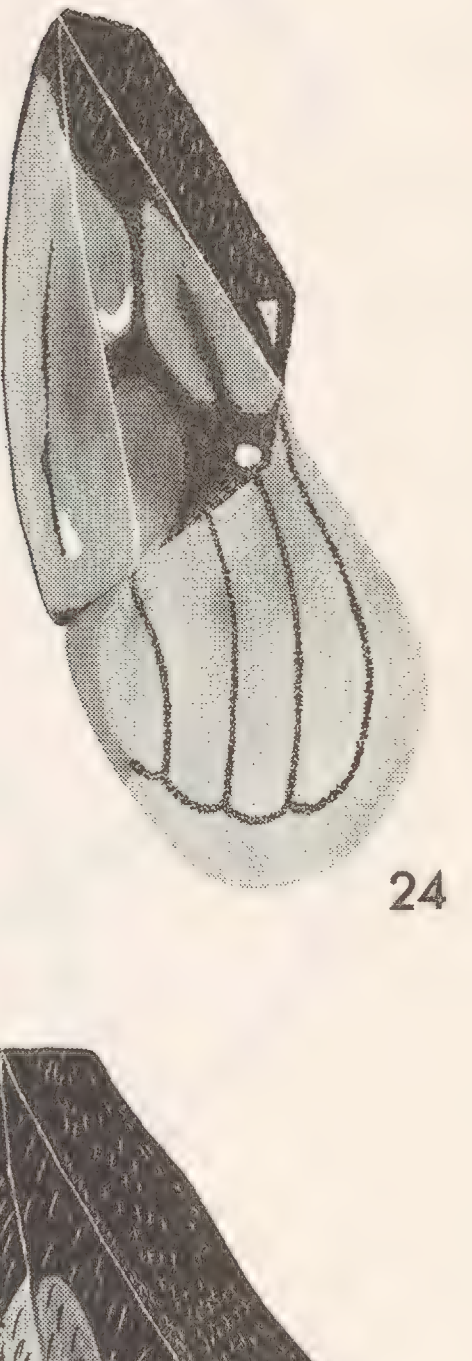

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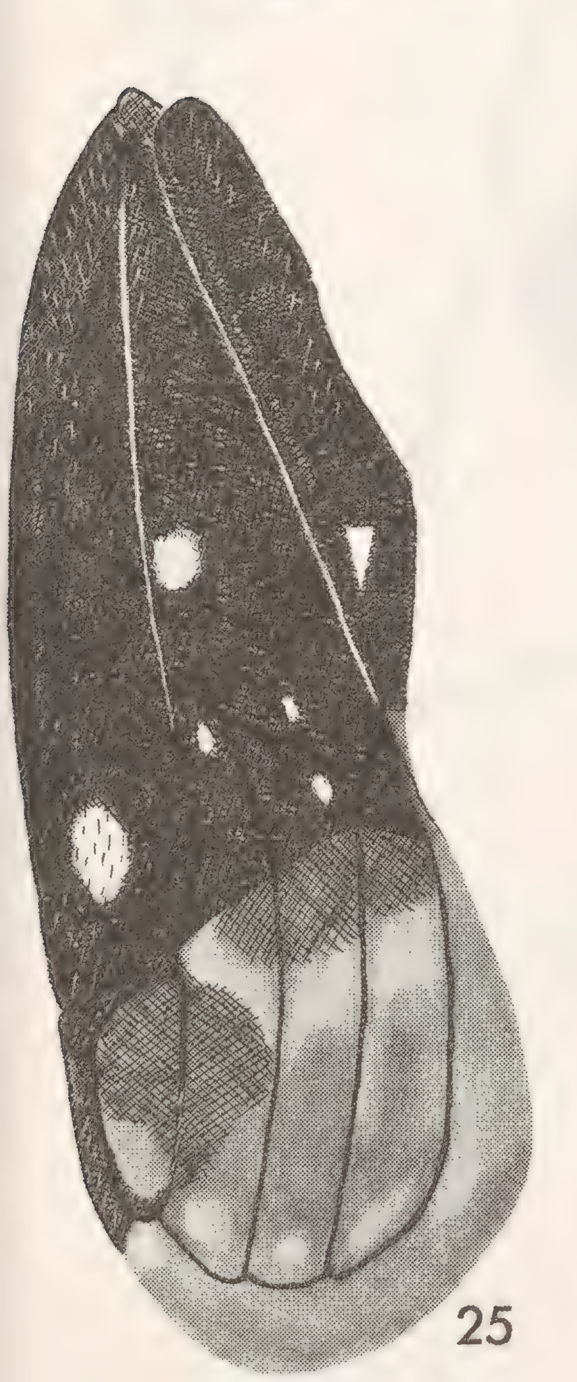

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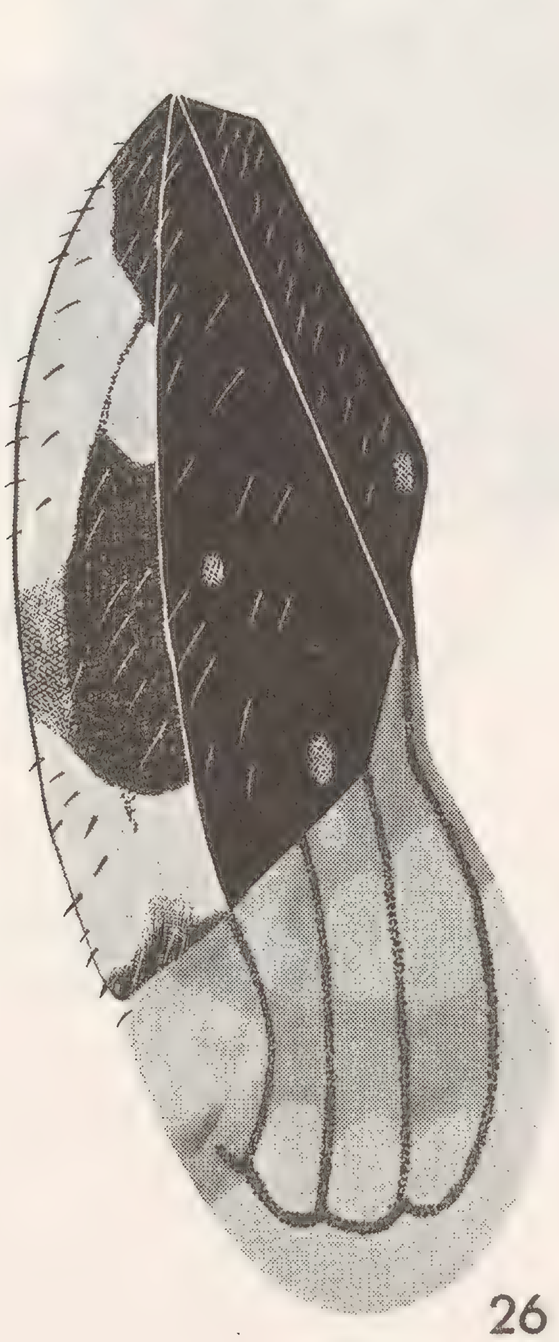

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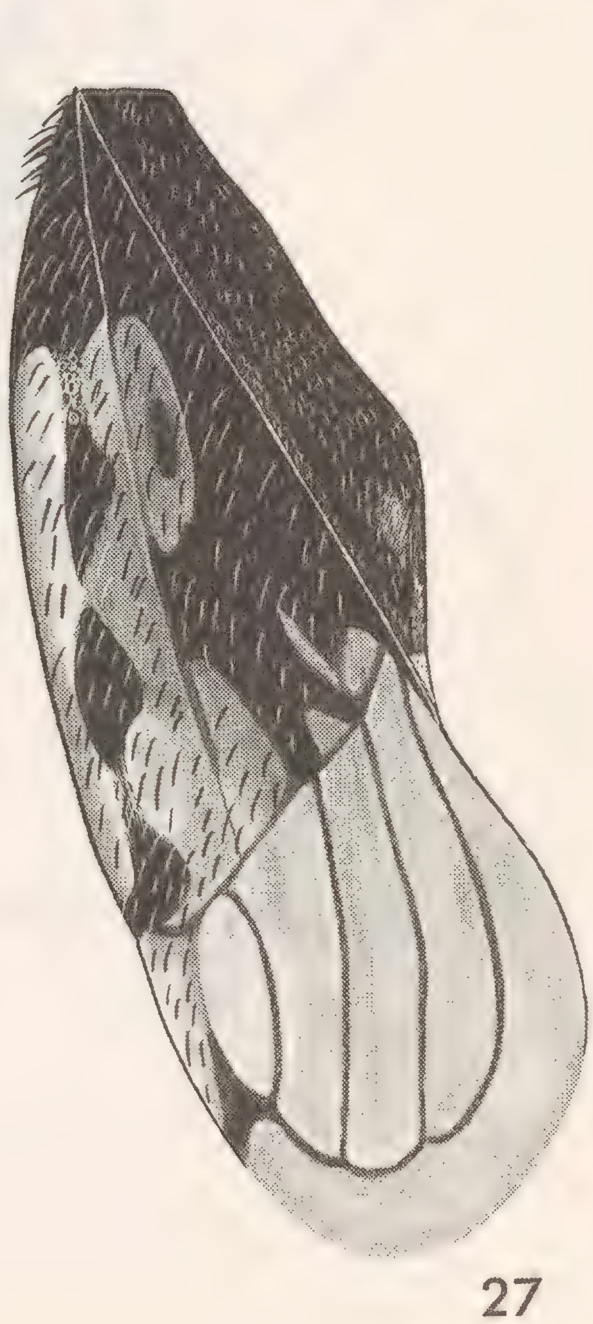

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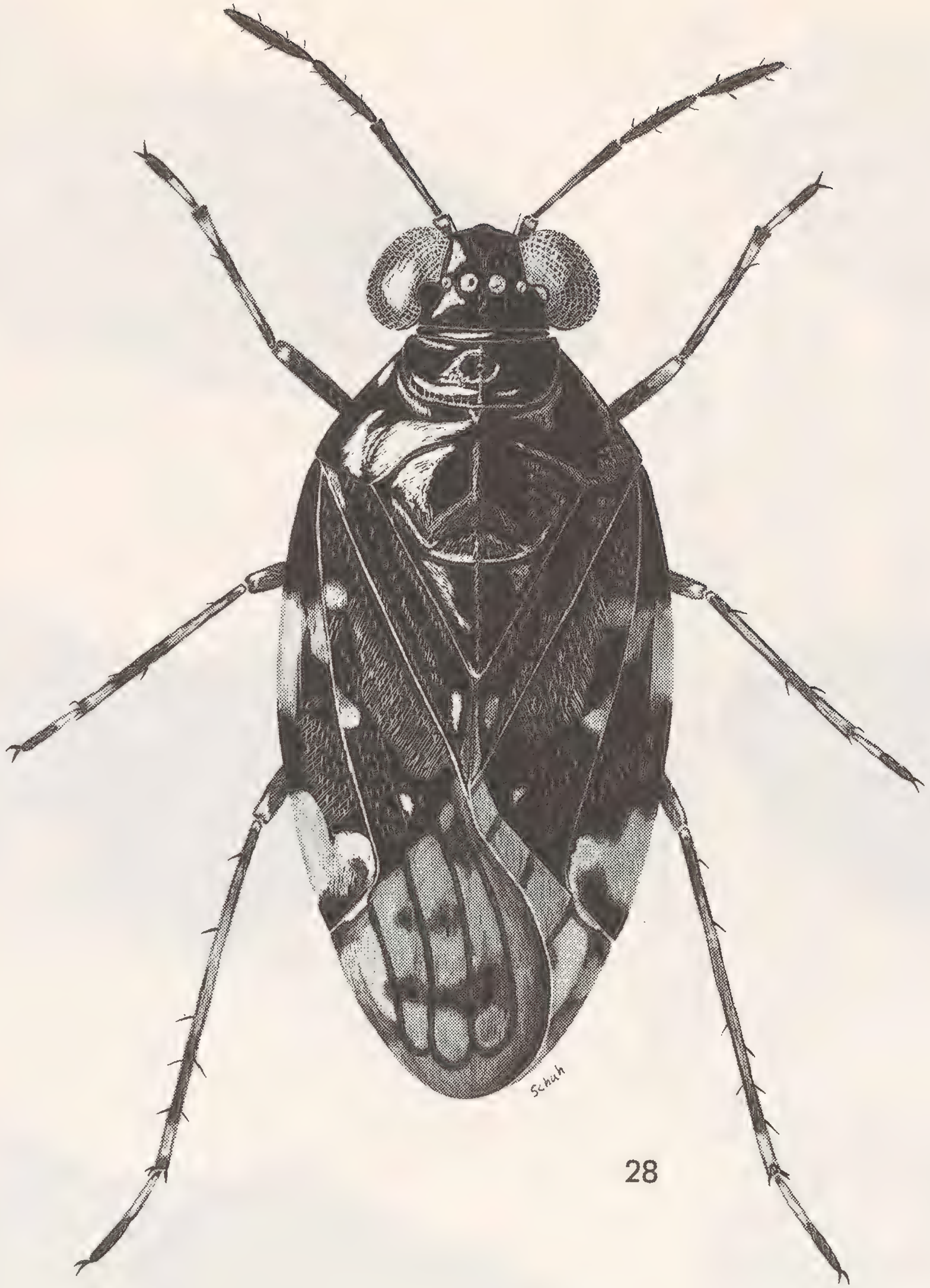

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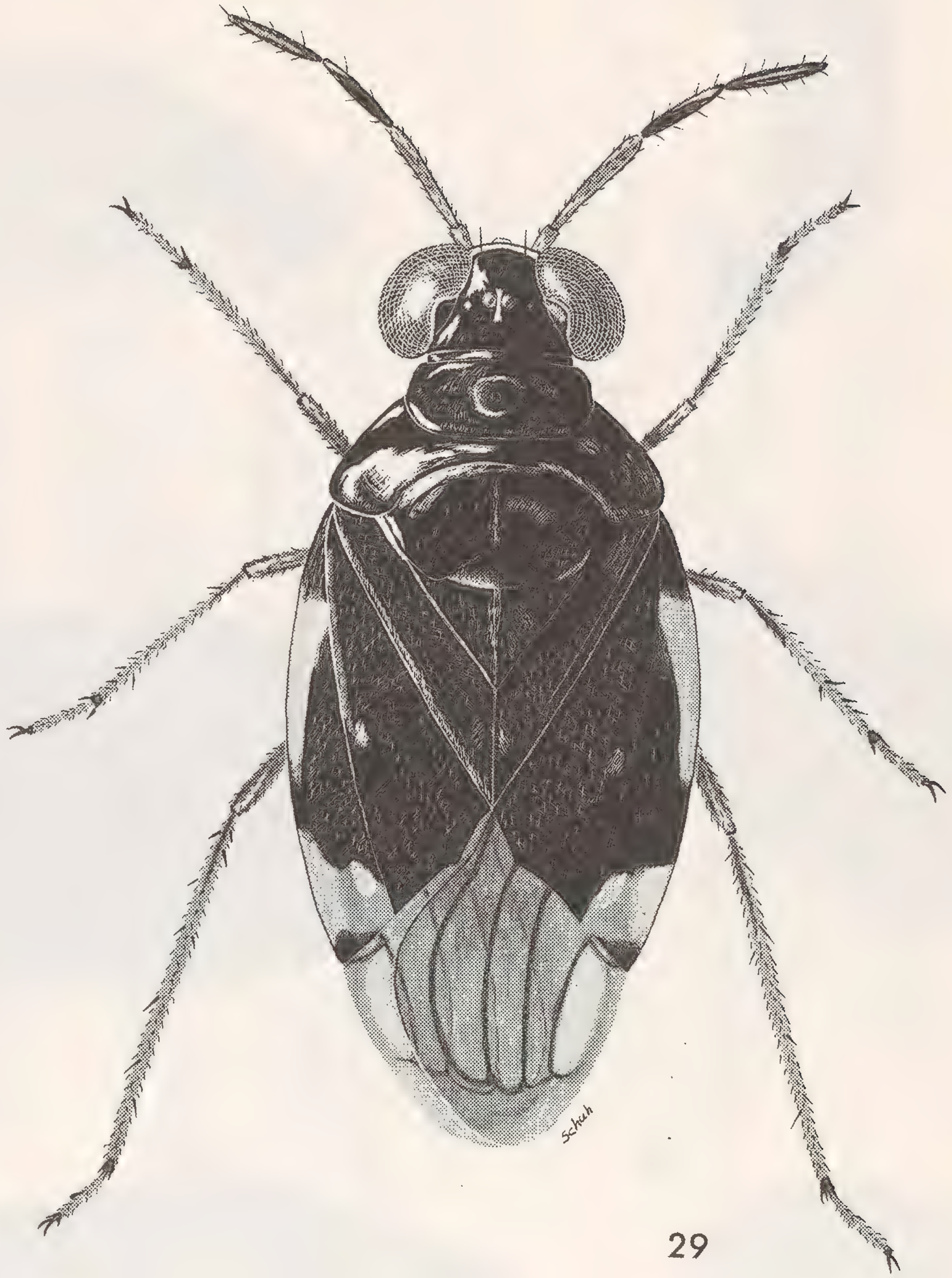

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Fig. 28.--Micracanthia floridana Drake and Chapman ♂ (Michigan, Emmet County, Maple River at Brutus Road).
Fig. 29.--Micracanthia ripula Drake ♂ (Michigan, Keweenaw County, Montreal River, T58N R30W Section 14).

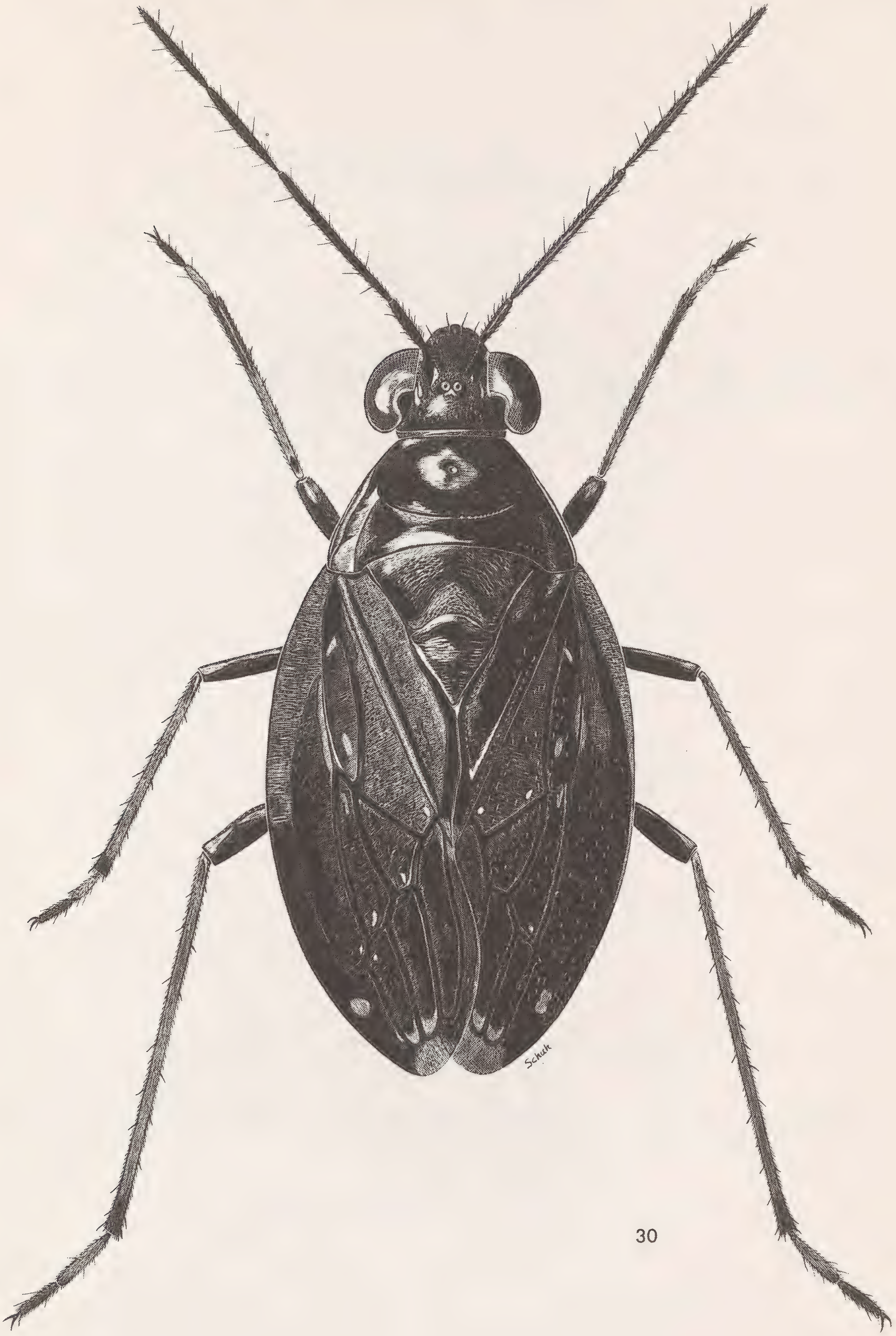

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Fig. 30.--*Salda* (*Salda*) *bouchervillei* (Provancher) ♀ brachypterous (Michigan, Keweenaw County, Little Betsy River).